ATTACHMENT E

RESULTS FROM PREVIOUS WILDLIFE STUDIES IN THE OIL SANDS REGION

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Table E-1 Moose Aerial Survey Results Within the Oil Sands Region

Year	Project	Results (individuals/km^2 unless otherwise noted)	Habitat	Reference
1969 to 1985	Alberta Environment	0.21 to 0.54	n/a	Gunderson and Rippin (1981) cited in BP Resources (1985)
1973	Alberta Environment	0.50	n/a	Bibaud and Archer (1973)
1975 to 1976	Syncrude Lease 17	0.23	preferred tall shrub, deciduous and avoided mixedwood in early winter; preferred tall shrub and avoided coniferous in late winter	Penner (1976)
1977	AOSERP[(a)]	0.03 in muskeg 0.23 in aspen 0.27 in river bottom	n/a	Cook and Jacobsen (1978)
1977 to 1978	AOSERP	0.26 in March 0.28 in December 0.19 in February	n/a	Hauge and Keith (1981) as reported in Conor Pacific (1998)
1978	Syncrude Lease 17	0.10	n/a	Hauge and Keith (1981)
1978 to 1979	Esso Cold Lake Expansion	0.14 to 0.18	n/a	Esso (1979)
1978 to 1981	Alberta Environment	0.25 to 0.34	n/a	Gunderson and Rippin (1981) cited in BP Resources (1985)
1979 to 1980	SyncrudeLease 17	0.13 in December 0.23 in February	December most in mixedwood, black spruce-muskeg and shrub February most in deciduous and mixedwood	Westworth (1980)
1980	Canstar Project 80	0.10 in December	most in riparian shrub and black spruce-muskeg	Skinner and Westworth (1981)
1981	Dome Petroleum Ltd	0.17	n/a	Roe (1984) cited in Suncor (1995)
1981 to 1982	Canstar Lease	0.33 in early winter 0.32 in late winter	most in mixedwood, aspen and willow wetlands in early winter most in willow wetlands, mixedwood, black spruce and aspen in late winter	Westworth and Brusnyk (1982)
1983	AOSTRA	0.18 in February	n/a	Green (1983) as reported in Conor Pacific (1998)
1985	Alberta Environment	0.52	n/a	Penner and Ealey, cited in Suncor (1995)
1986	OSLO[(b)]	0.11 in early winter 0.07 in late winter	n/a	Salter and Duncan (1986)
1991	Esso Cold Lake Expansion	0.14	n/a	Brusnyk et al. (1991) cited in Esso (1997)
1992 to 1993	Alberta Environment	0.10	n/a	AENV, Fish and Wildlife Division, cited in Esso (1997)
1995	Solv-Ex Oil Sands Co-production Experimental Project	0.01 in March	n/a	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	0.10 in January	most in black spruce-tamarack	Westworth, Brusnyk and Associates (1996b)

Table E-1 Moose Aerial Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (individuals/km^2 unless otherwise noted)	Habitat	Reference
1996	Suncor Mine, Lease 23 and Steepbank Mine	0.20 in February 0.32 in December	preferred closed deciduous, closed mixedwood and avoided closed jack pine, closed white spruce, mixed coniferous, black spruce, wetlands shrub complex and disturbed habitat in February; avoided closed jack pine, closed white spruce and mixed coniferous in December	Westworth, Brusnyk and Associates (1996a)
1996	Suncor Steepbank	0.24 in February 0.24 in December	preferred closed deciduous, closed mixedwood and avoided closed jack pine, closed white spruce, mixed coniferous, black spruce, wetlands shrub complex and disturbed habitat in February avoided closed jack pine, closed white spruce and mixed coniferous in December	Westworth, Brusnyk and Associates (1996a)
1998	Suncor Firebag Project	0.2 in February	most in FTNN	Suncor (2000)
1999	Mobil Lease 36	0.22 in February	most in FONS, FTNN and FT/STNN	Golder (1999b)
1999 to 2000	Petro-Canada MacKay River	0.37 in December 0.17 in February	found mostly in d1	AXYS (2000a)
2000	Canadian Natural Primrose and Wolf Lake Project	0.07	n/a	Canadian Natural (2000)
2000	PanCanadian Christina Lake Thermal Project Study Area	0.04 in late winter	three in BTNN and two in FTNN	Golder (2000c)
2000	TrueNorth Fort Hills Oil Sands Project	0.22 in mid winter 0.25 in late winter	only in d1, b1 and disturbed in mid winter most in d1 and d2 in late winter	Golder (2000d)
2000	OPTI Long Lake Project	0.20 in January 0.28 in March	most observations in FTNN and BTNN	OPTI (2000)
2001	Canadian Natural (Rio Alto) Kirby Project	0.08 in February	two moose observed in FTNN	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.21 in February	most observations in FTNN, d2 and e1	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	0.21	most observations in FTNN, h1, SONS and d2	Golder (2002a)
2001	Canadian Natural Horizon Project	0.15	most observations in d1, d2 and e1	Canadian Natural (2002)
2002	Petro-Canada Meadow Creek Aerial Ungulate Survey	0.10 in February	observed in BTNN, SONS, FTNN, d1, d2 and d3 ecosite phases/wetlands types.	Golder (2002b)

Table E-1 Moose Aerial Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (individuals/km^2 unless otherwise noted)	Habitat	Reference
2003	Petro-Canada Meadow Creek Aerial Caribou Survey	0.13 in February	observed in d3, g1, BTNN, SONS, and WONN ecosite phase/wetlands types.	Golder (2003a)
2002	Suncor South Tailings Pond Project	0.1	observed in b3 and FTNN	Golder (2003b)
2002	Devon Jackfish Project	0.16	most observations in closed aspen forest	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	0.09	observed in d2 and FONS	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.07	observed within d1, d2, BTNN and FONS	MEG (2005)
2004	Suncor Voyageur	0.10 0.05	observed in b3 observed in FTNN	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	0.05	observed in d1, d2, BTNN, and FONS	Canadian Natural (2006)
2006	Devon Jackfish 2 Project	0.16	observed in burn area, aspen forest, mixedwood forest, treed bog, treed fen, tall shrub, and open jack pine forest	Devon Canada (2006)
2006	Suncor Voyageur South	0.25	observed in d1, FTNN, cutblocks, BTNN, FONS	Non-published data
2006	Confidential Project	0.06	observed in FTNN, FONS	n/a

(a) AOSERP = Alberta Oil Sands Environmental Research Program.

(b) OSLO = Other Six Lease Owners.

n/a = Not applicable.

Table E-2 Moose Productivity in the Oil Sands Region

Year	Project	Cow:Calf Ratio	Reference
1975 to 1976	Syncrude Lease 17	10:5.6	Penner (1976)
1979 to 1980	Syncrude Lease 17	10:6.2 in December 10:4.3 in February	Westworth (1980)
1980	Canstar Project 80	10:3 in December	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	10:3.0 in early winter 10:3.2 in late winter	Westworth and Brusnyk (1982)
1995	Syncrude Aurora North	10:7.1 in January	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	10:8.3 in February 10:6.4 in December	Westworth, Brusnyk and Associates (1996a)
1996	Suncor Steepbank	10:4.3 in February 10:3.5 in December	Westworth, Brusnyk and Associates (1996a)
1999	Mobil Lease 36	10:1.7	Golder (1999b)
1999 to 2000	Petro-Canada MacKay River	10:6.3 in December 10:7.8 in February	AXYS (2000a)
2000	TrueNorth Fort Hills Oil Sands Project	10:10	Golder (2000d)
2000	OPTI Long Lake Project	10:8	OPTI (2000)
2001	Petro-Canada Meadow Creek Project	10:5	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	10:1.1	Golder (2002a)
2001	Canadian Natural Horizon Project	10:3.5	Canadian Natural (2002)
2002	Petro-Canada Meadow Creek Ungulate Aerial Survey	10:6.7	Golder (2002b)
2003	Petro-Canada Meadow Creek Caribou Aerial Survey	10:7.5	Golder (2003a)
2002	Suncor South Tailings Pond Project	10:5	Golder (2003b)
2002	Devon Jackfish Project	10:6.4	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	10:2.5	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	10:2.5	MEG (2005)
2004	Suncor Voyageur	n/a	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	10:5	Canadian Natural (2006)
2006	Devon – Jackfish 2 Project	10:4	Devon Canada (2006)
2006	Suncor Voyageur South	n/a	Non-published data
2006	Confidential Project	1:1	n/a

n/a = Not applicable.

Table E-3 Moose Track Count Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day)	Habitat Preference	Reference
1975 to 1976	Syncrude Lease 17	0.14	preferred tall shrub; avoided coniferous and disturbed areas	Penner (1976)
1980	Canstar Project 80	0.63	preferred riparian shrub; avoided jack pine and open muskeg	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.33	preferred willow and riparian aspen; avoided jack pine, white spruce, black spruce and riparian white spruce	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Project	no observations	n/a	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	0.11[(a)]	preferred cleared aspen; avoided mixedwood forest, willow wetlands riparian balsam poplar, riparian white spruce and riparian shrub	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	0.22 in February 0.65 in December	February: avoided jack pine, white spruce, mixed coniferous mixedwood, shorelines and fen December: avoided closed black spruce and open tamarack fen	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	0.26	no preference most tracks observed in closed mixedwood-white spruce dominant	Golder (1997a)
1997	Suncor Millennium	0.29 in January 0.30 in February 0.19 in March	January: avoided upland February: preferred riparian, avoided escarpment March: no preference	Golder (1998a,b)
1997	Suncor Millennium	0.03 in January 0.0 in February	January: no preference February: no preference	Golder (1998a,b)
1997	Mobil Lease 36	0.32	most observations in black spruce –tamarack and tamarack black spruce bogs and fens	URSUS and Komex (1997)
1998	Suncor Firebag Project	0.41	preferred BTNN, BFNN, FONS and FTNN/FFNN avoided b4, c1, d3 and g1	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	0.0 in reclaimed 0.46 in riparian area beside disturbance	n/a	Golder (1999a)

Table E-3 Moose Track Count Survey Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day)	Habitat Preference	Reference
2000	ATCO Pipeline	mean: 2.0	most common in cutblock, also common in FONS, d1 and d2	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	0.37	preferred e1; avoided d2, g1, BTNN and FTNN	Golder (2000d)
2000	Albian Sands Lease 13 West	0.56 in upland 0.60 in riparian	vegetation preferences not available due to lumping by landform	Golder (2000e)
2000	Suncor Wildlife Monitoring	0.0 in Lease 86/17 1.68 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	0.25	no preference most tracks observed in the d2 and FTNN ecosite phase/wetlands types	OPTI (2000)
2001	Gulf Surmont In-situ Oil Sands Project	no overall tracks/km-track day provided	highest track densities in e2; also observed in b2, c1, d1, d2, e3, f1, g1, BTNN, FTNN, FONS and FONG	Gulf (2001)
1999 to 2001	Albian Sands Lease 13 West	mean densities: 0.56 in January 1999/2000 0.21 in January 2000/2001 0.16 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors	Golder (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	0.57 in February	No preference; most tracks observed in d2 and c1 ecosite/wetlands types, but also observed in b3 and cutlines	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.52	tracks observed in c1, e1, BTNN, STNN; preference observed for BTNN, avoidance of FONS	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	0.47	tracks observed in b4, FTNN, g1 and shrubland	Golder (2002a)
2001	Canadian Natural Horizon Project	0.16	tracks observed in d2, d3, cutblock and burn; preference observed for burn, avoidance of d3	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	0.72	tracks observed in FONS, FONG, and d2	Golder (2003b)
2002	Devon-Jackfish Project	0.26	highest track density in e1	Devon Canada (2004)

Table E-3 Moose Track Count Survey Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day)	Habitat Preference	Reference
2003	Encana Christina Lake Thermal Project	no fresh tracks observed	old track observed in riparian creek area	Golder (2004a)
2004	Christina Lake Regional Project MEG Energy	0.34	no preferences determined, tracks observed within MONS, d1, d2 and FTNN	MEG (2005)
2004	Suncor Monitoring Five Year Report	0.59	surveys conducted in natural sites	Golder (2004c)
2004	Suncor Voyageur	0.45 0.70	preference for deciduous forests observed in b3, d1, d2, d3, and BTNN	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	0.22	observed in d1, disturbed-cutline, FONS, FTNN, and STNN; most in d1	Canadian Natural (2006)
2005	Devon Jackfish 2 Project	0.49	most trails observed in burn area and closed riparian shrubland	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.2	most observed in e3	OPTI/Nexen (2006)
2006	Suncor Voyageur South	0.66	preference for b3, e1, d1	Non-published data
2006	Confidential Project	0.25	avoidance FTNN	n/a
2007	Kai Kos Dehseh	0.2	most observed in d2	North American 2007

n/a = Not applicable.

Table E-4 Deer Aerial Survey Results Within the Oil Sands Region

Year	Project	Species	Results (individuals/km^2 unless otherwise noted)	Habitat	Reference
1975 to 1976	Syncrude Lease 17	combined	one mule deer observed	Athabasca River	Penner (1976)
1978 to 1979	Esso Cold Lake Production	combined	0.14	n/a	Esso 1979 as reported in BP Resources et al. (1985)
1980	Canstar Project 80	combined	no observations	n/a	Skinner and Westworth (1981)
1978 to 1981	Alberta Environment	combined	0.28 in 1979 to 0.50 in 1981	n/a	Gunderson and Rippin (1985) as reported in BP Resources et al. (1985)
1981 to 1982	Canstar Lease	mule deer	no observations	n/a	Westworth and Brusnyk (1982)
1981 to 1982	Canstar Lease	white-tailed deer	0.01 in early winter no observations in late winter	in mixedwood, white spruce and aspen not available for late winter	Westworth and Brusnyk (1982)
1983 to 1985	Alberta Environment	combined	0.31 in 1984 to 0.44 in 1985.	n/a	Gunderson and Rippin (1985) as reported in BP Resources et al. (1985)
1984	Alberta Environment	combined	0.20	n/a	Gunderson (1984) as reported in Canadian Natural (2000)
1984	Alberta Environment	combined	0.44	n/a	Gunderson (1984) as reported in Canadian Natural (2000)
1993	Alberta Environment	combined	0.53	aspen, shrubland and shrubby fen	AENV (1993) as reported ESSO 1997
1995	Solv-Ex Oil Sands Co-production Experimental Progect	combined	no observations	n/a	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	white-tailed deer	0.08	most in cleared peatland, riparian shrub and black spruce-tamarack	Westworth, Brusnyk & Associates (1996b)
1996	Suncor Mine, L23 and Steepbank Study Area	white-tailed deer	February: 2 individuals December: 5 individuals	both in deciduous forest 2 in mixedwood and 3 in deciduous forest	Westworth, Brusnyk & Associates (1996a)
1998	Suncor Firebag Project	combined	no observations	n/a	Suncor (2000)
1999	Mobil Lease 36	white-tailed deer mule deer	0.02 in February no observations	one d1 ecosite phase	Golder (1999b)
1999 to 2000	Petro-Canada MacKay River	white-tailed deer	0.15 in December 0.04 in February	most common in d1	AXYS (2000a)

Table E-4 Deer Aerial Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Results (individuals/km^2 unless otherwise noted)	Habitat	Reference
2000	PanCanadian Christina Lake Thermal Project	white-tailed deer	0.02 in late winter	three in c1 ecosite phase	Golder (2000c)
2000	Canadian Natural PAW Project	combined	0.03	observed in b1 and d2 ecosite phase	Canadian Natural (2000)
2000	TrueNorth Fort Hills Oil Sands Project	mule deer	no observations	n/a	Golder (2000d)
2000	TrueNorth Fort Hills Oil Sands Project	white-tailed deer	no observations in January 0.03 km^2 in March	only in b1 ecosite phase in March	Golder (2000d)
2000	OPTI Long Lake Project	combined	0.12 km^2 in January; and not observed in March	observations recorded in the d1, d2 and d3 ecosite phase/wetlands types	OPTI (2000)
2001	Canadian Natural (Rio Alto) Kirby Project	n/a	no observations	n/a	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	white-tailed deer	0.03	two individuals observed in the d2 ecosite phase/wetlands type	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	combined	no observations	n/a	Golder (2002a)
2001	Canadian Natural Horizon Project	white-tailed deer mule deer	0.17 0.01	WTDE observed mostly in disturbed habitat, primarily cutblocks, also observed in d3, e1, and MONS mule deer observed in d1 and d2	Canadian Natural (2002)
2002	Petro-Canada Meadow Creek Ungulate Aerial Survey	white-tailed deer	0.06 in February	observations occurred within upland areas; majority in d2 and one observation in b3	Golder (2002b)
2003	Petro-Canada Meadow Creek Caribou Aerial Survey	white-tailed deer	0.04 in February	observations occurred within upland areas; d2 and d1 ecosites	Golder (2003a)
2002	Suncor South Tailings Pond Project	combined	no observations	n/a	Golder (2003b)

Table E-4 Deer Aerial Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Results (individuals/km^2 unless otherwise noted)	Habitat	Reference
2002	Devon Jackfish Project	white-tailed deer	0.12	most observations in upland habitats (mixed jack pine- aspen, aspen, mixed aspen- white spruce and jack pine)	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	white-tailed deer	0.17	observations in a1 and g1	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	combined	no observations	n/a	MEG (2005)
2005 to 2006	Canadian Natural Primrose East Expansion	combined	no observations	n/a	Canadian Natural (2006)
2006	Devon Jackfish 2 Project	white-tailed deer	0.02	observed in upland habitats (aspen and mixed aspen-white spruce)	Devon Canada (2006)
2006	Suncor Voyageur South	deer	0.04	observed in d1, d2, FTNN	Non-published data
2006	Confidential Project	combined	0.11	observed in FTNN	n/a

n/a = Not applicable.

Table E-5 Deer Track Count Survey Results Within the Oil Sands Region

Year	Project	Species	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1975 to 1976	Syncrude Lease 17	combined	no observations	n/a	Penner (1976)
1980	Canstar Project 80	combined	one deer track observed	n/a	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	combined	one individual observed	only in mixedwood forest	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	combined	no observations	n/a	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	white-tailed deer	0.26	preferred aspen forest and cleared peatland; avoided jackpine, black spruce/ tamarack, fen wetlands, riparian balsam poplar, riparian white spruce and riparian shrub	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	white-tailed deer	0.09 in February 0.14 in December	preferred closed deciduous forest	Westworth, Brusnyk and Associates (1996a)
1997	Muskeg River Mine	combined	no observations	n/a	Golder (1997a)
1997	Suncor Winter Wildlife	combined	no observations	n/a	Golder (1998a,b)
1997	Mobil Kearl Lake	combined	0.04	tracks observed in aspen, aspen-white spruce and jack-pine	URSUS and Komex (1997)
1998	Suncor Firebag Project	combined	no observations	n/a	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	combined	0.57 in reclaimed 0.0 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Pipeline	combined	mean: 0.9	most common in d2 and e2	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	white-tailed deer	0.33	most in a1, b1, d2, e1 and e2	Golder (2000d)
2000	Albian Sands Lease 13 West	combined	0.08 in upland 0.02 in riparian	only in aspen dominated only in aspen dominated	Golder (2000e)
2000	Suncor Wildlife Monitoring	combined	0.37 in Lease 86/17 0.57 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	combined	0.75	preferred d2; avoided d1, FTNN	OPTI (2000)
2001	Gulf Surmont In-situ Oil Sands Project	combined	No overall tracks/km-track day provided	highest track densities in a1 and e2; also found in b1, b2,b3, d1, d2, d3, e1, e3, f1, h1, FONS and FTNN	Gulf (2001)
1999 to 2001	Albian Sands Lease 13 West	combined	mean densities: 0.08 in January 1999/2000 1.45 in January 2000/2001 0.39 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors	Golder (2001)

Table E-5 Deer Track Count Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2001	Canadian Natural (Rio Alto) Kirby Project	combined	0.2	one track observed in SONS	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	combined	1.45	preferred b1 and d2; avoided g1, BTNN and FONS	Petro-Canada (2001)
2001	Canadian Natural Horizon Project	combined	0.07	tracks observed in d1, d2, d3 and BTNN	Canadian Natural (2002)
2001	Shell Jackpine Mine – Phase 1	combined	no observations	n/a	Golder (2002a)
2002	Suncor South Tailings Pond Project	combined	no observations	n/a	Golder (2003b)
2002	Devon Jackfish Project	combined	0.74	highest track density in f1	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	combined	4.66	preferred disturbed areas	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	combined	0.41	no preferences; tracks observed within d1, d2, d3, e2, c1, a1, FTNN	MEG (2005)
2004	Suncor Monitoring Five Year Report	combined	0.34	surveys conducted in natural sites	Golder (2004a)
2004	Suncor Voyageur	combined	0.19 0.14	preference for white spruce forests and disturbed areas observed in b3 and BTNN	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	combined	0.83	occurred in a1, b3, BTNN, d1, d2, d3, FTNN, g1, and WONN; preferred WONN, avoided BTNN, c1, and g1	Canadian Natural (2006)
2005	Devon Jackfish 2 Project	combined	1.29	most observed in i1, d3, and d1	Devon Canada (2006)
2005 to 2006	Long Lake South Project	combined	0.5	most observed in e2	OPTI/Nexen (2006)
2006	Suncor Voyageur South	combined	1.51	preference for d2, e3, g1, h1	Non-published data
2006	Confidential Project	combined	1.35	preference for b1, b3 avoidance of b4, BTNN, d2, clearcut, FONS, FTNN, g1, h1, ROW	n/a
2007	Kai Kos Dehseh	combined	0.3	most observed in i2	North American 2007

n/a = Not applicable.

Table E-6 Caribou Aerial Survey Results Within the Oil Sands Region

Year	Project	Results (individuals/km^2 unless otherwise noted)	Habitat	Reference
1975 to 1976	Syncrude Lease 17	no observations	n/a	Penner (1976)
1976 to 1978	AOSERP	4.17/100 km^2 in winter	black spruce occupied most heavily year round, while aspen or aspen conifer mixes were used very little	Fuller and Keith (1981)
1980	Canstar Project 80	no observations	n/a	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	no observations	n/a	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	no observations	n/a	BOVAR-CONCORD (1995)
1995	Syncrude Aurora North	no observations	n/a	Westworth, Brusnyk and Associates (1996a)
1996	Suncor Mine, L23 and Steepbank Study Area	no observations	n/a	Westworth, Brusnyk and Associates (1996b)
1998	Firebag Project	no observations	n/a	Suncor (2000)
1999	Mobil Lease 36	no observations	n/a	Golder (1999b)
2000	PanCanadian Christina Lake Thermal Project	no observations	n/a	Golder (2000c)
2000	True North Fort Hills Oil Sands Project	no observations	n/a	Golder (2000e)
2000	Canadian Natural Primrose and Wolf Lake Project	6 observations	observed in c1/g1	Canadian Natural (2000)
2000	Canadian Natural Primrose and Wolf Lake Project	telemetry survey data	primarily observed in FTNN or FTNR, BTNN, BTNI, BTNR, BTXC, c1 or g1, and a1	Canadian Natural (2000)
2000	OPTI Long Lake Project	0.00/km^2 in January; 0.01/km^2 in March; and 11 incidental observations of caribou sign	deciduous, fen and pond[(a)]	OPTI (2000)
2001	Petro-Canada Meadow Creek Project	0.35 in February	wooded fen	Petro-Canada (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	no observations aerially; 26 incidental observations	c1 and g1, e1, BTNN, FONS, FTNN, MONS, and WONN	Rio Alto (2002)

Table E-6 Caribou Aerial Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (individuals/km^2 unless otherwise noted)	Habitat	Reference
2001	Shell Jackpine Mine – Phase 1	no observations	n/a	Golder (2002a)
2001	Canadian Natural Horizon Project	no observations	n/a	Canadian Natural (2002)
2002	Devon Jackfish Project	no direct observations	forage sight and tracks observed in treed fen and shrubby bog	Devon Canada (2004)
2002	Petro-Canada Meadow Creek Project	0.03 in February	treed bog	Golder (2002b)
2003	Petro-Canada Meadow Creek Project	0.15 in February	BTNN, FONG, c1, FTNN, MONG, MONS and disturbance (wellpads, cutlines)	Golder (2003a)
2003	EnCana Christina Lake Thermal Project	no observations	n/a	Golder (2004a)
2004	MEG Energy Regional Christina Lake Project	no observations	n/a	MEG (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	0.04	FTNN	Canadian Natural (2006)
2006	Devon Jackfish Phase 2 Project	0.05	shrubby/treed bog and treed fen	Devon Canada (2006)
2006	Confidential Project	no observations	n/a	n/a

AOSERP = Alberta Oil Sands Environmental Research Program.

n/a = Not applicable.

Table E-7 Caribou Track Count Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1975 to 1976	Syncrude Lease 17	no observations	n/a	Penner (1976)
1981	Canstar Project 80	no observations	n/a	Skinner and Westworth (1981)
1982	Canstar Lease	0.01	only in mature mixedwood forest	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	no observations	n/a	BOVAR-CONCORD (1995)
1995	Syncrude Aurora North	no observations	n/a	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, L23 and Steepbank Study Area	no observations	n/a	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River mine	no observations	n/a	Golder (1997a)
1997	Suncor Wildlife Monitoring	no observations	n/a	Golder (1998b)
1998	Suncor Firebag Project	no observations	n/a	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	no observations	n/a	Golder (1999a)
2000	True North Fort Hills Oil Sands Project	no observations	n/a	Golder (2000d)
2000	Albian Sands Lease 13 West	no observations	n/a	Golder (2000c)
2000	Suncor Wildlife Monitoring	no observations	only riparian corridors sampled	Golder (2000b)
2000	OPTI Long Lake Project	11 incidental observations of caribou sign	deciduous, fen and pond	OPTI (2000)
2001	Gulf Surmont In-situ Oil Sands Project	incidental observations in g1, c1, BTNN and FONS	n/a	AXYS (2001a)
2001	Petro-Canada Meadow Creek Project	2.1	tracks observed in d1, BTNN, FONS; a preference was observed for the d1 and avoidance of d2 and BTNN	Petro-Canada (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	no observations	n/a	Rio Alto (2002)
2001	Shell Jackpine Mine – Phase 1	no observations	n/a	Golder (2002a)
2001	Canadian Natural Horizon Project	no observations	n/a	Canadian Natural (2002)
2002	Devon Jackfish Project	no observations	n/a	Devon Canada (2004)

Table E-7 Caribou Track Count Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2003	EnCana Christina Lake Thermal Project	no observations	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.51 (35 individual tracks)	preference for FTNN, avoidance of BTNN, also occurred within a1, c1, cutline, FONS, g1	MEG (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	0.27	tracks observed in disturbed-cutline, c1, FONS, FTNN, and WONN; preferred FTNN, avoided d1, d2, g1, and BTNN	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	no observations	n/a	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.1	most observed in j2 and k1	OPTI/Nexen (2006)
2006	Confidential Project	no observations	n/a	n/a
2007	Kai Kos Dehseh	0.09	most observed in j1, j2	North American 2007

n/a = Not applicable.

Table E-8 Wolf Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	Traplines	0.14 animals/ 100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	0.07	no preference	Penner (1976)
1975 to 1978	AOSERP	winter densities 1/92 km^2 to 1/198 km^2	n/a	Fuller and Keith (1980)
1980	Canstar Project 80	0.01	only in jack pine and black spruce-muskeg	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.04	preferred willow wetlands and riparian aspen; avoided balsam poplar, jack pine, white spruce and riparian white spruce	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	no observations	n/a	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	0.05	preferred black spruce/tamarack; avoided aspen forest and mixedwood forest	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	0.14 in December 0.09 in February	avoided closed mixedwood	Westworth, Brusnyk and Associates (1996a)
1997	Muskeg River Mine	no observations	n/a	Golder (1997a)
1997	Suncor Winter Wildlife	0.31 in January 0.0 in February 0.0 in March	January: preferred upland, avoided escarpment	Golder (1998a,b)
1997	Suncor Winter Wildlife	no observations	n/a	Golder (1998a,b)
1997	Mobil Lease 36	0.38	most in lake shore emergent habitat and along main roads	URSUS and Komex (1997)
1998	Suncor Firebag Project	no observations	n/a	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	0.09 in reclaimed 0.08 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Pipeline	mean: 0.5	most common in FONG, h1 and d1	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	no observations	n/a	Golder (2000d)
2000	Albian Sands Lease 13 West	0.01 in upland 0.04 in riparian	n/a	Golder (2000e)
2000	Suncor Wildlife Monitoring	0.0 in Lease 86/17 0.11 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	0.01	tracks observed in the d2 and h1 ecosite phase/wetlands types	OPTI (2000)

Table E-8 Wolf Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2001	Gulf Surmont In-situ Oil Sands Project	no overall tracks/km-track day provided	observed at low densities in d1, e1, e2, f1, FONS, FTNN and FONG	Gulf (2001)
1999 to 2001	Albian Sands Lease 13 West	mean densities: 0.03 in January 1999/2000 0.04 in January 2000/2001 0 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors	Golder (2001)
2001	Candadian Natural (Rio Alto) Kirby Project	0.13	tracks observed in b2, d2 and FONS ecosite / wetlands types	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.07	two sets of tracks observed in d2	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	0.03	three sets of tracks in d2	Golder (2002a)
2001	Canadian Natural Horizon Project	0.08	tracks observed in b1, d1, d2, d3, FONS and cutblock	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	0.03	tracks observed in e2 ecosite phase; no habitat prefences determined	Golder (2003b)
2002	Devon Jackfish Project	0.03	tracks observed in a1, d1, i2 and k2	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	no observations	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.03	tracks observed in c1, g1	MEG (2005)
2004	Suncor Monitoring Five Year Report	0.15	surveys conducted in natural sites	Golder (2004a)
2004	Suncor Voyageur	0.25 0.01	preference for mixedwood forests tracks observed in disturbed-cutline	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	no observations	n/a	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	0.32	n/a	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.1	most observed in b1	OPTI/Nexen (2006)
2006	Suncor Voyageur South	0.17	preference for d1, d2	Non-published data
2006	Confidential Project	0.10	avoidance of FTNN	n/a
2007	Kai Kos Dehseh	0.09	most observed in b1, d1	North American 2007

n/a = Not applicable.

AOSERP = Alberta Oil Sands Environmental Research Program.

Table E-9 Coyote Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km–track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	0.44 animals/100 km^2	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	0.29	preferred disturbed habitat; avoided aspen, aspen-willow/alder and black spruce-willow	Penner (1976)
1978	Syncrude Alsands	0.29	n/a	Alsands (1978)
1979	Esso Cold Lake Production Project	0.35 individuals/km^2	n/a	Esso (1979)
1980	Canstar Project 80	0.10	preferred black spruce-muskeg; avoided aspen, open muskeg and riparian shrub	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.13	preferred balsam poplar and jack pine; avoided aspen, white spruce willow and fen	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	0.72	most tracks in jack pine and black spruce	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	0.09	avoided cleared aspen and willow wetlands	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	0.45 in December 0.13 in February	preferred closed deciduous; avoided closed jack pine/white spruce, open black spruce and shoreline	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	0.10	most found in closed balsam poplar, closed mixedwood-white spruce dominant and closed white spruce	Golder (1997a)
1997	Suncor Winter Wildlife	0.24 in January 0.0 in February 0.0 in March	January: preferred upland	Golder (1998a,b)
1997	Suncor Winter Wildlife	0.06 in January 0.03 in February	January: no preference February: no preference	Golder (1998a,b)
1997	Mobil Lease 36	0.06	no preference	URSUS and Komex (1997)
1998	Suncor Firebag Project	0.03	no preference	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	2.23 in reclaimed 1.75 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Pipeline	mean: 0.6	most common in d3	AXYS (2000b)

Table E-9 Coyote Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km–track day unless otherwise noted)	Habitat Preference	Reference
2000	TrueNorth Fort Hills Oil Sands Project	0.02	only in d2, e1, e2 and shrub	Golder (2000d)
2000	Albian Sands Lease 13 West	0.03 in upland 0.11 in riparian	n/a	Golder (2000e)
2000	Suncor Wildlife Monitoring	0.68 in Lease 86/17 0.89 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	0.26	no preference; however most tracks were recorded in the FTNN, SONS, d2, d1 and STNN ecosite phase/wetlands types	OPTI (2000)
2001	Gulf Surmont In-situ Oil Sands Project	No overall tracks/km-track day provided	found in most ecosite phase/wetlands types (b1,b2, b3, c1, d1, d2, d3, e2, e3, f1, f2, h1, BTNN, FTNN, FONS and FONG)	Gulf (2001)
1999 to 2001	Albian Sands Lease 13 West	mean densities: 0.08 in January 1999/2000 0.74 in January 2000/2001 0.17 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors	Golder (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	0.13	no preferences; however, most tracks observed in the d2 and g1 ecosite/wetlands types	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.57	almost all tracks observed in d2 ecosite phase/wetlands type, but three sets observed in BTNN; preferred d2, avoided BTNN and FONS	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	0.01	one set of tracks in FTNN	Golder (2002a)
2001	Canadian Natural Horizon Project	0.20	tracks observed in b1, d2, d3, e3, g1, h1, FTNN, FONS and BTNN; preference for d2, avoidance of d1 (no observations)	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	0.60	tracks observed in d2 and FTNN ecosite/ wetlands types; no habitat prefences determined	Golder (2003)

Table E-9 Coyote Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km–track day unless otherwise noted)	Habitat Preference	Reference
2002	Devon Jackfish Project	1.29	highest densities in k3 and reclaimed industrial sites	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	0.50	most tracks observed along rights-of-way and in BTNN	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.45	Highest density in e2, also occurred in a1, b4, c1, d2, d3, e2, FTNN, g1	MEG (2005)
2004	Suncor Monitoring Five Year Report	1.62	surveys conducted in natural sites	Golder (2004c)
2004	Suncor Voyageur	1.04 0.49	preference for disturbed areas observed in a1, b1, b3, b4, d2, d3, g1, BTNN, disturbed-cutline	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	0.12	observed in FONS, WONN, and SONS	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	0.61	most observed in i1 and h1	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.2	most observed in f1	OPTI/Nexen (2006)
2006	Suncor Voyageur South	0.17	preference for e1, ROW	Non-published data
2006	Confidential Project	0.43	preference of BTNN avoidance of FTNN	n/a
2007	Kai Kos Dehseh	0.2	most observed in e1	North American 2007

n/a = Not applicable.

Table E-10 Red Fox Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	0.59 animals/ 100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	0.02	most found in disturbed habitat and forested black spruce	Penner (1976)
1980	Canstar Project 80	0.08	avoided aspen and open muskeg	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.02	avoided aspen, white spruce, fen and willow wetlands	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	0.95	most tracks in aspen and aspen-white spruce	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	0.01	found in mixedwood forest, fen wetlands, cleared peatland, riparian white spruce and riparian shrub	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	0.02	only in closed deciduous, disturbed and mixed coniferous	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	no observations	n/a	Golder (1997a)
1997	Suncor Winter Wildlife	0.05 in January 0.02 in February 0.0 in March	January: no preference February: no preference	Golder (1998a,b)
1997	Suncor Winter Wildlife	no observations	n/a	Golder (1998a,b)
1997	Mobil Lease 36	0.01	tracks recorded in closed black spruce and dwarf birch-willow shrubland	URSUS and Komex (1997)
1998	Suncor Firebag Project	0.01	only in c1, FONS and FTNN/FFNN	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	0.03 in reclaimed 0.23 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Pipeline	mean: 0.1	observed in e2 and d1	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	0.03	found in d2, d3 and shrub	Golder (2000d)
2000	Albian Sands Lease 13 West	0.31 in upland 0.10 in riparian	n/a	Golder (2000e)
2000	Suncor Wildlife Monitoring	0.0 in Lease 86/17 0.39 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	0.19	most tracks observed in the h1 and d2 ecosite phase	OPTI (2000)

Table E-10 Red Fox Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2001	Gulf Surmont In-situ Oil Sands Project	no overall tracks/km-track day provided	one observation in b2 ecosite phase	Gulf (2001)
1999 to 2001	Albian Sands Lease 13 West	mean densities: 0.15 in January 1999/2000 0 in January 2000/2001 0.01 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors	Golder (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	no observations	n/a	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.36	observed in b1, b3, c1, d2, e2 and BTNN	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	0.03	observed in BTNN	Golder (2002a)
2001	Canadian Natural Horizon Project	one set of tracks observed	tracks observed in SONS	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	no observations	n/a	Golder (2003b)
2002	Devon Jackfish Project	0.10	not able to determine preference	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	only 1 incidental observation	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.01	unable to determine preference, observed in FTNN	MEG (2005)
2004	Suncor Voyageur	0.02 no observations	preference for open habitats with brushy shelter n/a	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	no observations	n/a	Canadian Natural (2006)
2005	Devon Jackfish 2 Project	no observations	n/a	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.02	most observed in b4 and d1	OPTI/Nexen (2006)
2006	Suncor Voyageur South	0.03	observed in d1, d2, ROW, no demonstrated preference	Non-published data
2006	Confidential Project	0.08	observed in b3, BTNN, e3, FTNN, g1	n/a
2007	Kai Kos Dehseh	0.02	most observed in d1	North American 2007

n/a = Not applicable.

Table E-11 Canada Lynx Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	3.37 animals/100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	0.002	only in black spruce	Penner (1976)
1980	Canstar Project 80	0.06	preferred black spruce-muskeg; avoided aspen, mixedwood, open muskeg, riparian shrub and riparian white spruce	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.13	preferred aspen and riparian aspen; avoided jack pine, white spruce, black spruce, fen and willow wetlands	Westworth and Brusnyk (1982)
1985	BP Resources (Wolf Lake)	0.1 individuals/km^2	n/a	BP Resources et al. (1985)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	0.24	only in black spruce	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	no observations	n/a	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	no observations in December 0.01 in February	only in closed deciduous, mixed coniferous, black spruce-tamarack and disturbed	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	no observations	n/a	Golder (1997a)
1997	Suncor Winter Wildlife	0.0 in January 0.02 in February 0.05 in March	February: no preference March: no preference	Golder (1998a,b)
1997	Suncor Winter Wildlife	no observations	n/a	Golder (1998a,b)
1997	Mobil Lease 36	no observations	n/a	URSUS and Komex (1997)
1998	Suncor Firebag Project	no observations	n/a	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	no observations	n/a	Golder (1999a)
1999	AEC Foster Creek SAGD Project	no overall tracks/km-track day provided	tracks found in coniferous forest (jack pine/black spruce, treed bogs and shrubby fens	AXYS (1999)
2000	ATCO Pipeline	mean: 3.2	most common in FONG, and FONS	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	0.01	found in d2 and e2	Golder (2000d)

Table E-11 Canada Lynx Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2000	Albian Sands Lease 13 West	0.13 in upland 0.14 in riparian	n/a	Golder (2000e)
2000	Suncor Wildlife Monitoring	0.0 in Lease 86/17 0.04 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	0.50	most tracks were recorded in the d2, d1, FTNN and h1 ecosite phase/wetlands types	OPTI (2000)
2001	Gulf Surmont In-situ Oil Sands Project	no overall tracks/km-track day provided	found in most ecosite phase/wetlands types (a1, b1, b2, b3, c1, d1, d2, d3, e2, e3, g1, h1, BTNN, FTNN, FONS and FONG)	Gulf (2001)
1999 to 2001	Albian Sands Lease 13 West	mean densities: 0.14 in January 1999/2000 0.21 in January 2000/2001 0.28 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors	Golder (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	0.25	no preference observed, tracks found in b3, g1, FONS, FTNN, STNN	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.34	found most commonly in the BTNN and g1, but also observed in BFNN, c1, STNN	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	0.54	preferred d2; avoided FONS	Golder (2002a)
2001	Canadian Natural Horizon Project	0.84	tracks observed in b3, d1, d2, d3, e3, g1, BTNN, FTNN, FONS, STNN, SONS and WONN; preference for d1, avoidance of d2, FONG, SONS and burn	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	0.41	tracks observed in d2 ecosite phase; with habitat prefence for d2 and avoidance of FONS determined	Golder (2003b)
2002	Devon Jackfish Project	0.56	highest track densities in k1 and j1	Devon Canada (2004)
2003	EnCana Christina Lake Thermal Project	not observed	n/a	Golder (2004a)

Table E-11 Canada Lynx Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2004	Suncor Monitoring Five Year Report	0.08	surveys conducted in natural sites	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.13	no preferences, highest densities in disturbed-cutline, BTNN	MEG (2005)
2004	Suncor Voyageur	0.06 0.04	no preference determined observed in MONS, FTNN and disturbed - road	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	0.04	observed in FTNN and g1	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	0.05	observed in a1, b1, c1, and g1	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.2	most observed in f2 and f3	OPTI/Nexen (2006)
2006	Suncor Voyageur South	0.02	observed in b1, b3, b4, BTNN, FONS, FTNN, g1, road habitats, no preference demonstrated	Non-published data
2006	Confidential Project	0.09	avoidance of FTNN	n/a
2007	Kai Kos Dehseh	0.04	most observed in h1, c1, g1	North American 2007

n/a = Not applicable.

Table E-12 Black Bear Survey Results Within the Oil Sands Region

Year	Project	Results	Reference
1976	Alberta Environment	0.38 bears/km^2	Ruff et al. (1976)
1977	AOSERP	1 bear/2 to 4 km^2	Fuller and Keith (1977)
1978	AOSERP	1bear/4 to 5.6km^2	Young (1978)
1980	AOSERP	25-50/100 km^2 (telemetry)	Fuller and Keith (1980)
1981 to 1982	Canstar Lease	highest use in balsam poplar, mixedwood and white spruce; jack pine and black spruce habitats were low, while fen and willow wetlands were avoided	Westworth and Brusnyk (1982)
1982	Cold Lake	18-25/100 km^2 (telemetry)	Young and Ruff (1982)
1998	Suncor Firebag Project	12 incidental observations of individuals or sign	Suncor (2000)
2000	Canadian Natural Primrose and Wolf Lake Project	incidental observations in black spruce/jack pine, jack pine/aspen, treed fen, shrubby fen, aspen/white spruce, poor fen/bog, shrubby swamp, jack pine and cutblocks	Canadian Natural (2000)
2000	OPTI Long Lake Project	7 incidental observations of individuals or sign	OPTI (2000)
2001	Gulf Surmont In-situ Oil Sands Project	12 incidental observations of individuals or sign in b2, d1, d2, e2, f1, d1 and FONS	Gulf (2001)
2001	Petro-Canada Meadow Creek Project	9 incidental observations of individuals or sign in b1, d1, d3, e1	Petro-Canada (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	8 incidental observations in b3, e2, and BTNN	Rio Alto (2002)
2001	Shell Jackpine Mine – Phase 1	5 incidental observations in MONS, d2 and d3	Golder (2002a)
2001	Canadian Natural Horizon Project	14 incidental observations in b1, d1, d2	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	7 incidental observations in d2 ecosite phase and cutblocks	Golder (2003b)
2002	Devon Jackfish Project	no observations	Devon Canada (2004)
2003	EnCana Christina Lake Thermal Project	4 observations of bear or evidence of bear	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	8 incidental observations or evidence of bear within d2 and along cutlines	MEG (2005)
2004	Suncor Voyageur	3 incidental sightings in d2 1 incidental sighting in FTNN	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	36 observations of sign in SONS, g1, c1, d2i incidental observations of individuals in d2, h1, and STNN	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	no observations of sign	Devon Canada (2006)
2006	Suncor Voyageur South	no incidental sightings, see Appendix VI for remote camera results	Non-published data
2006	Confidential Project	2 incidental sightings in c1, g1 see Appendix VI for remote camera results	n/a

AOSERP = Alberta Oil Sands Environmental Research Program.

Table E-13 Wolverine Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	0.01 animals/ 100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	0.01	only in aspen and mixedwood	Penner (1976)
1979	Syncrude Lease 17	estimated 0.08 individuals/100km^2	n/a	Westworth & Associates (1979)
1980	Canstar Project 80	0.005	only in black spruce-muskeg	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	no observations	n/a	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	no observations	n/a	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	no observations	n/a	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	no observations	n/a	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	no observations	n/a	Golder (1997a)
1997	Suncor Winter Wildlife	no observations	n/a	Golder (1998a,b)
1997	Mobil Lease 36	0.01	in a black spruce burn and along seismic line through white spruce-aspen mixedwood	URSUS and Komex (1997)
1998	Suncor Firebag Project	no observations	n/a	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	no observations	n/a	Golder (1999a)
2000	ATCO Pipeline	no observations	n/a	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	no observations	n/a	Golder (2000d)
2000	Albian Sands Lease 13 West	no observations	n/a	Golder (2000e)
2000	Suncor Wildlife Monitoring	no observations	n/a	Golder (2000a)
2000	OPTI Long Lake Project	no observations	n/a	OPTI (2000)
1999 to 2001	Albian Sands Lease 13 West	no observations	n/a	Golder (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	no observations	n/a	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	no observations	n/a	Petro-Canada (2001)

Table E-13 Wolverine Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2001	Shell Jackpine Mine – Phase 1	no observations	n/a	Golder (2002a)
2001	Canadian Natural Horizon Project	no observations	n/a	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	no observations	n/a	Golder (2003b)
2002	Devon - Jackfish Project	no observations	n/a	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	no observations	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	no observations	n/a	MEG (2005)
2004	Suncor Monitoring Five Year Report	0.004	surveys conducted in natural sites	Golder (2004a)
2004	La Loche Road Link Project	1 track	Christina River	Golder (2004b)
2004	Suncor Voyageur	1 set of tracks no observations	observed in e3 n/a	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	no observations	n/a	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	no observations	n/a	Devon Canada (2006)
2005 to 2006	Long Lake South Project	no observations	n/a	OPTI/Nexen (2006)
2006	Suncor Voyageur South	0.02 no observations	observed in BTNN, 1 individual	Non-published data
2006	Confidential Project	no observations	n/a	n/a
2007	Kai Kos Dehseh	no observations	n/a	North American 2007

n/a = Not applicable.

Table E-14 Fisher and Marten Survey Results Within the Oil Sands Region

Year	Project	Species	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	fisher	0.43 animals/ 100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	fisher	0.06	no preference	Penner (1976)
1986	OSLO	fisher	No overall track count/km-track day provided	tracks were found in bogs, shrublands and fens	Duncan et al. (1986)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	fisher	1.52	most tracks in jack pine, white spruce and aspen-white spruce	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	fisher	0.02 in January	most in riparian balsam poplar	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	fisher	0.21 in December 0.04 in February	preferred black spruce tamarack; avoided upland coniferous/ mixedwood	Westworth, Brusnyk and Associates (1996a)
1997	Suncor Winter Wildlife	fisher	0.0 in January 0.29 in February	February: no preference	Golder (1998a,b)
1997	Suncor Winter Wildlife	fisher	0.02 in January 0.59 in February 0.15 in March	January: no preference February: prefer upland, avoid riparian and escarpment March: no preference	Golder (1998a,b)
1997	Mobil Lease 36	fisher	0.09	most in treed fens and bogs	URSUS and Komex (1997)
1998	Suncor Firebag Project	fisher	0.61	avoided b1, b2, d2 and d3	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	fisher	0.03 in reclaimed 1.64 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Pipeline	fisher	mean: 0.6	most common in b1, also common in FTNN and FONS	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	fisher	0.14	found in b1, d1, d2, BTNN and FTNN	Golder (2000d)
2000	Albian Sands Lease 13 West	fisher	0.81 in upland 1.16 in riparian	no landform preference	Golder (2000e)
2000	Suncor Wildlife Monitoring	fisher	0.0 in Lease 86/17 0.46 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	fisher	0.45	d2, h1	OPTI (2000)

Table E-14 Fisher and Marten Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1999 to 2001	Albian Sands Lease 13 West	fisher	mean densities: 1.02 in January 1999/2000 0.47 in January 2000/2001 0.77 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors	Golder (2001)
2001	Petro-Canada Meadow Creek Project	fisher	0.74	most often in d2 and e2 ecosite phase/wetlands types but also found in b1, e1, BTNN, STNN	Petro-Canada (2001)
2001	Gulf Surmont In-situ Oil Sands Project	fisher	no overall tracks/km-track day provided	highest densities in a1, also found in b2, c1, d1, d2, d3, e2, e3, g1, h1, FTNN and FONS	Gulf (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	fisher	0.06	no preference but tracks observed in b3, c1, g1	Rio Alto (2002)
2001	Shell Jackpine Mine – Phase 1	fisher	1.00	most often in FTNN, FONS, STNN, BTNN; incidentally observed on four occasions in h1, STNN, FTNN and FONG ecosite phase/wetlands types	Golder (2002a)
2001	Canadian Natural Horizon Project	fisher	0.19	tracks observed most often in d2, also observed in d3, g1 and cutblock	Canadian Natural (2002)
2006	Long Lake South Project	fisher	0.06	most observed in b4	OPTI/Nexen (2006)
2007	Kai Kos Dehseh	fisher	0.05	most observed in d3	North American 2007
1970 to 1975	traplines	marten	animals/100 km^2 trapped	n/a	Boyd (1977)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	marten	0.08	only in black spruce	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	marten	0.15 in January	preferred mixed coniferous and riparian white spruce; avoided black spruce- tamarack, open tamarack- bog birch, fen wetlands, willow wetlands, riparian balsam poplar, riparian shrub and cleared peatland	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	marten	0.04 in December 0.10 in February	preferred upland coniferous	Westworth, Brusnyk and Associates (1996a)

Table E-14 Fisher and Marten Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1997	Suncor Millennium Winter Wildlife	marten	0.38 in January 1.16 in February	January: avoided d1, d2, d3, shrub and WONN February: avoided a1 and d1	Golder (1998a,b)
1997	Suncor Millennium Winter Wildlife (L19, 25, 97)	marten	0.36 in January 0.35 in February 0.44 in March	January: avoided upland February: no preference march: preferred escarpment and avoid riparian	Golder (1998a,b)
1997	Mobil Lease 36	marten	1.03	most in riparian willow shrubland, white spruce – aspen mixedwood and white spruce	URSUS and Komex (1997)
1998	Suncor Firebag Project	marten	1.33	preferred FTNN/FFNN and avoided FONS	Suncor (2000)
1998 to 1999	Suncor Millennium Wildlife Monitoring	marten	0.03 in reclaimed 1.49 in riparian area beside disturbance	n/a	Golder (1999a)
2000	TrueNorth Fort Hills Oil Sands Project	marten	0.42	preferred b1 and BTNN avoided d1, d3, e1, g1, shrub and sons	Golder (2000d)
2000	Albian Sands Lease 13 West	marten	0.28 in upland 0.50 in riparian	no landform preference	Golder (2000e)
2000	ATCO Pipeline	marten	mean: 1.8	most common in BTNN and shrubby bog, also common in d3 and h1	AXYS (2000b)
2000	Suncor Millennium Wildlife Monitoring	marten	0.0 in Lease 86/17 0.54 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	marten	0.02	tracks observed in the d2 and FTNN ecosite phase/wetlands types	OPTI (2000)
1999 to 2001	Albian Sands Lease 13 West	marten	mean densities: 0.41 in January 1999/2000 0.52 in January 2000/2001 1.02 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors	Golder (2001)
2001	Gulf Surmont In-situ Oil Sands Project	marten	no overall tracks/km-track day provided	highest densities of tracks found in e2 and g1, also found in b1, d1, d2, e3, f1, h1, BTNN, FONS and FTNN	Gulf (2001)

Table E-14 Fisher and Marten Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2001	Petro-Canada Meadow Creek Project	marten	0.57	most often observed in b3 and d2 but also observed in c1, g1, e1 and BTNN	Petro–Canada (2001)
2001	Shell Jackpine Mine – Phase 1	marten	0.46	most observed in FTNN, b1, BTNN and FONS	Golder (2002a)
2001	Canadian Natural Horizon Project	marten	0.42	most observed in d2, also observed in d1, d3, e3, g1, BTNN, FTNN, FONS and STNN	Canadian Natural (2002)
2005 to 2006	Long Lake South Project	marten	0.2	most observed in l1	OPTI/Nexen (2006)
2007	Kai Kos Dehseh	marten	0.2	most observed in d2	North American 2007
1997	Shell Muskeg River Mine	combined	1.26	preferred closed balsam poplar, closed mixedwood, open and closed aspen	Golder (1997a)
1981	Canstar Project 80	combined	0.05	no preference	Skinner and Westworth (1981)
1982	Canstar Lease	combined	0.12	preferred mixedwood; avoided white spruce, black spruce, willow, fen and willow wetlands	Westworth and Brusnyk (1982)
1999	AEC Foster Creek SAGD Project	combined	tracks observed	n/a	AXYS (1999)
2000	OPTI Long Lake Project	combined	0.47	d2, h1	OPTI (2000)
2001	Canadian Natural (Rio Alto) Kirby Project	combined	0.17	tracks observed in b3, c1, d2, g1	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	combined	1.40	most often observed in d2, b3, e2 and BTNN; preferred d2 and avoided FONS	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	combined	1.75	most often observed in FTNN, FONS, BTNN and STNN; preferred FTNN, avoided d2 and h1	Golder (2002a)
2001	Canadian Natural Horizon Project	combined	0.97	most often observed in d2 (high effort), e3 and d1 but no significant preference or avoidance of habitat types	Canadian Natural (2002)

Table E-14 Fisher and Marten Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2002	Suncor South Tailings Pond Project	combined	0.85	most often observed in FONS wetlands type, also observed in BTNN, d2, and FTNN; preference for FONS and avoidance of d2 determined	Golder (2003b)
2002	Devon Jackfish Project	combined	0.29	highest track densities in g1	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	combined	no observations	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	combined	0.09	No preferences could be determined but recorded within g1, BTNN, FTNN	MEG (2005)
2004	Suncor Monitoring Five Year Report	combined	1.45	surveys conducted in natural sites	Golder (2004a)
2004	Suncor Voyageur	combined	1.00 1.37	preference for deciduous and white spruce forests preference for b3	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	combined	0.11	most in g1	Canadian Natural (2006)
2005	Devon Jackfish 2 Project	combined (more than 90% fisher)	0.08	observed in sc, g1, burn area, and b1	Devon Canada (2006)
2006	Suncor Voyageur South	combined	1.34	preference for d1	Non-published data
2006	Confidential Project	combined	0.26	avoidance of FTNN	n/a

n/a = Not applicable.
OSLO = Other Six Lease Owners.

Table E-15 Weasel Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	1.92 animals/ 100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	1.47	preferred aspen-willow/alder, treed black spruce and tall shrub; avoided black spruce-willow and disturbed	Penner (1976)
1980	Canstar Project 80	1.14	preferred black spruce muskeg; avoided jack pine and open muskeg	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.27	preferred willow; avoided balsam poplar, jack pine, white spruce and riparian white spruce	Westworth and Brusnyk (1982)
1985	OSLO	no overall track count/km-track day provided	low densities in forested and unforested habitats, high use of logged areas.	Duncan et al. (1986)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	1.75	most tracks in black spruce and jack pine	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	1.22	preferred black spruce- tamarack, open tamarack bog birch and cleared peatland; avoided aspen forest, mixedwood forest, mixed coniferous, fen wetlands, willow wetlands and riparian white spruce	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	5.16 in December 0.83 in February	preferred black spruce-tamarack, open black spruce, open tamarack/fen and fen; avoided closed jack pine, closed mixedwood, wetlands shrub complex, disturbed and shoreline	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	1.12	preferred closed mixedwood-white spruce dominant and closed mixedwood; avoided closed balsam poplar, open and closed aspen, closed mixed coniferous	Golder (1997a)
1997	Suncor Millennium Winter Wildlife (L29)	0.80 in January 0.78 in February	January: avoided Shrub, BTNN and WONN February: preferred BTNN; avoided a1, d1, d2, d3 and h1	Golder (1998a,b)
1997	Suncor Millennium Winter Wildlife (L19, 25, 97)	0.71 in January 0.48 in February 0.00 in March	January: prefer riparian avoid escarpment February: no preference	Golder (1998a,b)

Table E-15 Weasel Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1997	Mobil Lease 36	0.2	most in tamarack forest and riparian willow shrubland	URSUS and Komex (1997)
1998	Suncor Firebag Project	1.0	preferred FONS; avoided a1, b1, b2, d1, d2 and d3	Suncor (2000)
1998 to 1999	Suncor Millennium Wildlife Monitoring	0.16 in reclaimed 1.75 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Muskeg River Pipeline	mean: 2.1	most common in h1	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	0.31	preferred FTNN; avoided a1, b1, d1, d3, e2 and BTNN	Golder (2000d)
2000	Albian Sands Lease 13 West	no observations	n/a	Golder (2000e)
2000	Suncor Millennium Wildlife Monitoring	0.40 in Lease 86/17 0.78 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	0.46	tracks mainly were observed in the FTNN, d2 and h1 ecosite phase/wetlands types	OPTI (2000)
1999 to 2001	Albian Sands Lease 13 West	no observations	n/a	Golder (2001)
2001	Gulf Surmont In-situ Oil Sands Project	no overall tracks/km-track day provided	found in b1, b2, d2, e3, f1, f2, g1, h1 and FTNN	Gulf (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	0.38	no preference, most commonly observed in g1 and FTNN; one set of tracks each observed in STNN and disturbed	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.48	observed in c1, g1 and BTNN ecosite phase/wetlands types	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	0.67	observed in d2, FONS, FTNN, h1, SONS and STNN; preferred FTNN, avoided d2 and STNN	Golder (2002a)
2001	Canadian Natural Horizon Project	0.65	observed in b3, d1, d2, d3, e1, e3, g1, BTNN, FTNN, FONG, FONS, STNN, SONS, and cutblock; avoided e3	Canadian Natural (2002)

Table E-15 Weasel Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2002	Suncor South Tailings Pond Project	1.00	observed in FONS, FTNN, FONG and d2; preference for FONS and FTNN; avoided d2	Golder (2003b)
2002	Devon Jackfish Project	0.9	highest track densities in k3	Devon Canada (2004)
2003	EnCana Christina Lake Thermal Project	0.69	most observations in FTNN	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.35	no preferences; most abundant in b4 and b2	MEG (2005)
2004	Suncor Monitoring Five Year Report	0.53	surveys conducted in natural sites	Golder (2004a)
2004	Suncor Voyageur	0.70 0.59	preference for treed wetlands most abundant in b3 and BTNN	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	0.52	most observations in c1, g1, and BTNN; preference for c1 and avoidance of WONN	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	0.06	observed in j1 and d1	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.1	most observed in f2	OPTI/Nexen (2006)
2006	Suncor Voyageur South	1.59	preference for ROW	Non-published data
2006	Confidential Project	1.78	preference for FONS, FTNN avoidance b3, b4, burn, d2, g1	n/a
2007	Kai Kos Dehseh	0.06	most observed in d3, i2	North American 2007

n/a = Not applicable.

OSLO = Other Six Lease Owners.

Table E-16 Beaver Survey Results Within the Oil Sands Region

Year	Project	Results	Reference
1970 to 1975	traplines	12.9 animals/ 100 km^2 trapped	Boyd (1977)
1975 to 1976	Syncrude Lease 17	0.14 to 1.0/km river or creek; 1.9/km^2	Penner (1976)
1978	AOSERP	0.32 active lodges/km of stream and 0.14 active lodges/km of lakeshore	Searing (1979)
1978	AOSERP	0.40 active lodges/km of stream	Gilbert et al. (1979) as reported in Conor Pacific (1998)
1978	Syncrude Lease 17	0.32 food caches/km^2 0.26 active lodges/km^2	Westworth (1978) as reported in Conor Pacific (1998)
1979	Syncrude Lease 17	0.29 food caches/km^2 0.23 active lodges/km^2	Westworth (1979) as reported in Conor Pacific (1998)
1980	Canstar Project 80	0.11 active lodges/km^2 or 0.16/km Muskeg River	Skinner and Westworth (1981)
1981	Canstar Lease	0.42 active lodges/km^2	Westworth and Brusnyk (1982)
1983	AOSERP	0.81 food caches/km^2 0.94 active lodges/km^2	Green (1983) as reported in Conor Pacific (1998)
1984	Syncrude Mildred Lake	0.44 food caches/km^2	Pauls (1984) as reported in Conor Pacific (1998)
1985	OSLO	0.32 food caches/km^2	Salter and Duncan (1986)
1985	BP Resources Wolf Lake	0.2 active lodges/km in wetlands	BP Resources et al. (1985)
1985	BP Resources Wolf Lake	0.3 active lodges/km for shoreline 0.6 active lodges/km for creeks	Young and Bjornson (1985)
1986	Syncrude	0.52 food caches/km^2	Pauls and Arner (1987) as reported in Conor Pacific (1998)
1988	Syncrude	0.42 food caches/km^2	Pauls (1989) as reported in Conor Pacific (1998)
1991	Syncrude	0.46 food caches/km^2	Pauls (1991) as reported in Conor Pacific (1998)
1996	Aurora Mine	0.09 active lodge and food caches/km^2 and 0.57 active lodge and food caches /km^2 on the previous Alsands Site	Fort McKay Environmental Services (1996)
1998	Mobil Lease 36	0.37 active lodges/km^2	Golder (1999b)
1999	OPTI Long Lake Project	0.61 active lodges/km^2 or 1.6 active lodges/km	OPTI (2000)
2001	Canadian Natural (Rio Alto) Kirby Project	0.02 active lodges/ha of lake 0.02 inactive lodges/ha of lake 0.00 active lodges/km of tributary 1.14 inactive lodges/km of tributary	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.08 active lodges/ha of lake 0.20 active lodges/km of drainage	Petro-Canada (2001)

Table E-16 Beaver Survey Results Within the Oil Sands Region (continued)

Year	Project	Results	Reference
2001	Shell Jackpine Mine – Phase 1	0.69 active lodges/km of tributary 0.66 inactive lodges/km of tributary	Golder (2002a)
2001	Canadian Natural Horizon Project	0.05 active lodges/ha of lake 0.08 inactive lodges/ha of lake 1.17 active lodges/km of tributary 1.27 inactive lodges/km of tributary	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	0.78 active lodges/km of tributary 1.17 inactive lodges/km of tributary	Golder (2003b)
2003	EnCana Christina Lake Thermal Project	3 incidental sightings during other surveys on the LSA	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.84 food caches/km^2 of lake (0.008/ha) 1.03 active lodges/km^2 of lake (0.010/ha) 0.21 food caches/km of stream 0.17 active lodges/km of stream	MEG (2005)
2004	Suncor Voyageur	0.34 active lodges/km of tributary 0.45 inactive lodges/km of tributary 1.4 active lodges/km of tributary 0.2 inactive lodges/km of tributary	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	3 incidental observations of individuals or sign during other surveys	Canadian Natural (2006)
2006	Suncor Voyageur South	0.16 active lodges/km of watercourse 0.22 inactive lodges/km of watercourse 0.02 active lodges/lake 0.01 inactive lodges/lake	Non-published data
2006	Confidential Project	0.03 active lodges/km of stream 0.04 active lodges/lake	n/a

AOSERP = Alberta Oil Sands Environmental Research Program.
OSLO = Other Six Lease Owners.

Table E-17 Muskrat Survey Results Within the Oil Sands Region

Year	Project	Results	Reference
1970 to 1975	traplines	6.13 animals/ 100 km^2 trapped	Boyd (1977)
1975 to 1976	Syncrude Lease 17	estimate of 0.3 - 2.5 muskrats/ha	Penner (1976)
1980	Canstar Project 80	0.03 houses/km^2 (6 houses observed within the 176 km^2 study area)	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.02 houses/km^2 (6 houses in 387 km^2 study area)	Westworth and Brusnyk (1982)
1983	Syncrude	39 muskrat houses, common on Ruth Lake and Horseshoe Lake	Murray and Pauls (1983)
1984	Syncrude	48 muskrat houses recorded	Pauls (1984)
1986	Syncrude	25 muskrat lodges recorded, most on Horseshoe lake	Pauls and Arner (1987)
1989	Syncrude	64 houses recorded, most on Horseshoe lake	Pauls (1989)
1990	Syncrude	no observations	Pauls (1991)
1991	Syncrude	low number observed	Pauls (1991)
1996	Aurora Mine	no observations	Fort McKay Environmental Services Ltd (1996)
1997	Suncor Millennium Winter Wildlife	no observations	Golder (1998a,b)
1997	Mobil Lease 36	0.21 houses/km^2 and 0.84 feeding platforms/km^2	URSUS and Komex (1997)
2000	OPTI Long Lake Project	0.54 push ups/km^2	OPTI (2000)
2000	Canadian Natural Primrose and Wolf Lake Project	muskrat houses were observed in shrubby fen and shallow open water with wetlands	Canadian Natural (2000)
2001	Canadian Natural (Rio Alto) Kirby Project	0.01 push-ups/ha of lake 0.29 push-ups//km of tributary	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.00 push-ups/km^2	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	no observations	Golder (2002a)
2001	Canadian Natural Horizon Project	0.02 push-ups/ha of lake 0.07 push-ups//km of tributary	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	no observations	Golder (2003b)
2004	MEG Energy Christina Lake Regional Project	2.06 push-ups/km of tributary	MEG (2005)
2004	Suncor Voyageur	no observations	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	2 incidental observations of individuals during other surveys	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	no observations	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.01 tracks/km-track day; most observed in j2	OPTI/Nexen (2006)
2006	Suncor Voyageur South	1 lodge and 12 push-ups observed	Non-published data
2006	Confidential Project	1 lodge and no push-ups observed	n/a

Table E-18 River Otter Track Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	0.12 animals/ 100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	0.0007	n/a	Penner (1976)
1980	Canstar Project 80	0.01(all) 0.06 (riparian)	only in riparian habitat	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.0005	n/a	Westworth and Brusnyk (1982)
1985	BP Resources Wolf Lake	general observations	n/a	BP Resources et al. (1985)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	no observations	n/a	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	0.02	only in riparian shrub, fen and willow wetlands	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	0.01	only in shoreline	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	0.01	only in riparian shrub dominant	Golder (1997a)
1997	Suncor Winter Wildlife	no observations	n/a	Golder (1998a,b)
1998	Suncor Firebag Project	no observations	n/a	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	0.0 in reclaimed 0.04 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Pipeline	mean: 0.6	most common in FONG	AXYS (2000b)
2000	Canadian Natural Primrose and Wolf Lake Project	incidental observations	n/a	Canadian Natural (2000)
2000	TrueNorth Fort Hills Oil Sands Project	0.02	found in FTNN and SONS	Golder (2000d)
2000	Albian Sands Lease 13 West	0.0 in upland 0.11 in riparian	n/a	Golder (2000e)
2000	Suncor Wildlife Monitoring	0.0 in Lease 86/17 0.06 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	1 set of old tracks observed	mixedwood	OPTI (2000)
1999 to 2001	Albian Sands Lease 13 West	mean observations: 0.07 in January 1999/2000 0.10 in January 2000/2001 0.01 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors, however, the animal's ecology sugegsts a preference for riparian areas	Golder (2001)

Table E-18 River Otter Track Survey Track Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2001	Canadian Natural (Rio Alto) Kirby Project	0.02	one set of tracks observed in WONN	Rio Alto (2002)
2001	Gulf Surmont In-situ Oil Sands Project	no overall tracks/km-track day provided	found in F1 and FONG	Gulf (2001)
2001	Petro-Canada Meadow Creek Project	0.05	tracks observed in d2 and e1	Petro–Canada (2001)
2001	Shell Jackpine Mine – Phase 1	no observations	n/a	Golder (2002a)
2001	Canadian Natural Horizon Project	0.02	observed in SONS and WONN	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	no observations	n/a	Golder (2003b)
2002	Devon Jackfish Project	1 observed track in g1	n/a	Devon Canada (2004)
2003	EnCana Christina Lake Thermal Project	1 set of tracks observed incidentally	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	2 incidental observations	stream/MONS	MEG (2005)
2004	Suncor Voyageur	1 set of tracks observed no observations	n/a	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	no observations	n/a	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	no observations	n/a	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.01	most observed in e3	OPTI/Nexen (2006)
2006	Suncor Voyageur South	no observations	n/a	Non-published data
2006	Confidential Project	no observations	n/a	n/a
2007	Kai Kos Dehseh	0.008	observed in h1, i1	North American 2007

n/a = Not applicable.

Table E-19 Mink Track Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	2.26 animals/ 100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	0.1	most in riparian, aspen-willow and deciduous dominated mixedwood[(a)]	Penner (1976)
1980	Canstar Project 80	0.10	preferred riparian shrub; avoided aspen, jack pine, black spruce muskeg and open muskeg	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	0.10	preferred willow wetlands; avoided aspen, balsam poplar, mixed wood, jack pine, white spruce and black spruce	Westworth and Brusnyk (1982)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	no observations	n/a	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	0.22 in January	preferred riparian shrub; avoided aspen and mixedwood forest, jack pine, mixed coniferous, black spruce-tamarack, fen and willow wetlands, riparian balsam poplar and cleared peatland	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	0.02	most in wetlands shrub complex	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	0.03	only in riparian shrub dominant	Golder (1997a)
1997	Suncor Winter Wildlife	0.59 in January no observations in February	January: avoided a1, d3, d1, d2, h1, FTNN, BTNN and WONN	Golder (1998a,b)
1997	Suncor Winter Wildlife	no observations	n/a	Golder (1998a,b)
1997	Mobil Lease 36	0.01	only in riparian willow shrubland	URSUS and Komex (1997)
1998	Suncor Firebag Project	0.01	only in FONS and FTNN/FFNN	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	0.13 in reclaimed 0.19 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Pipeline	mean: 0.4	most common in FONG	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	no observations	n/a	Golder (2000d)
2000	Albian Sands Lease 13 West	0.00 in upland 0.07 in riparian	n/a	Golder (2000e)
2000	Suncor Wildlife Monitoring	0.0 in Lease 86/17 0.02 in Lease 25/97	only riparian corridors sampled	Golder (2000a)

Table E-19 Mink Track Survey Track Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2000	OPTI Long Lake Project	0.02	tracks observed in wooded fen (FTNN) wetlands type	OPTI (2000)
1999 to 2001	Albian Sands Lease 13 West	mean densities: 0.05 in January 1999/2000 0.00 in January 2000/2001 0.15 in February 2000/2001	surveys conducted in riparian and upland habitat no evidence of use of riparian areas as movement corridors, however, animal's ecology suggests a preference for riparian areas	Golder (2001)
2001	Gulf Surmont In-situ Oil Sands Project	no overall tracks/km-track day provided	found in riparian communities (f1 andf2) and FONG	Gulf (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	no observations	n/a	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.02	observed in e1	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	no observations	n/a	Golder (2002a)
2001	Canadian Natural Horizon Project	one set of tracks observed	observed in e3	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	no observations	n/a	Golder (2003b)
2002	Devon Jackfish Project	n/a	8 tracks encountered, 6 of which occurred in k3 associated with lower order streams	Devon Canada (2004)
2003	EnCana Christina Lake Thermal Project	no observations	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	no observations	n/a	MEG (2005)
2004	Suncor Voyageur	0.09 no observations	preference for shrubby wetland n/a	Golder (2005)
2004 to 2005	Primrose East Expansion	no observations	n/a	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	no observations	n/a	Devon Canada (2006)
2005 to 2006	Long Lake South Project	0.01	most observed in k2	OPTI/Nexen (2006)
2006	Suncor Voyageur South	no observations	n/a	Non-published data
2006	Confidential Project	0.01	e2	n/a
2007	Kai Kos Dehseh	0.01	most observed in j3	North American 2007

(a) Not statistically significant.

n/a = Not applicable.

Table E-20 Snowshoe Hare Track Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day)	Habitat Preference	Reference
1975 to 1976	Syncrude Lease 17	2.94	preferred aspen-willow/alder, mixedwood, forested black spruce and tall shrub; avoided aspen-balsam poplar, jack pine, treed black spruce, black spruce-willow, dwarf birch-tamarack, riparian and disturbed	Penner (1976)
1980	Canstar Project 80	21.15	preferred mixedwood, black spruce-muskeg and riparian white spruce; avoided aspen, jack pine and open muskeg	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	76.2	preferred aspen and balsam poplar; avoided mixedwood, white spruce, black spruce, willow, fen, willow wetlands and riparian aspen	Westworth and Brusnyk (1982)
1986	OSLO	no overall track count/km-track day provided	track densities were greatest in aspen-dominated, pine dominated mixed and spruce forests	Duncan et al. (1986)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	14.69	most tracks in aspen-white spruce and white spruce	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	3.53 in January	preferred mixed coniferous and black spruce-tamarack; avoided cleared aspen, aspen and mixedwood forests, jack pine, open tamarack bog-birch, fen and willow wetlands, riparian balsam poplar and riparian shrub	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	4.14 in December 0.49 in February	preferred closed jack pine, closed mixedwood, closed mixed coniferous-black spruce dominant and open black spruce; avoided closed white spruce, closed deciduous, black spruce tamarack, open tamarack/fen, wetlands shrub complex, disturbed, shoreline and fen	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	22.36	preferred closed jack pine, closed white spruce, closed balsam poplar, closed mixed conifer-black spruce dominant, closed mixedwood-white spruce dominant and closed black spruce bog; avoided wetlands shrub complex, open black spruce bog, riparian shrub dominant, open and closed aspen	Golder (1997a)
1997	Suncor Winter Wildlife	0.98 in January 5.80 in February	January: preferred d2; avoided a1, d3, d1, h1, Shrub, BTNN and WONN February: preferred d2; avoided d1, d3, FTNN and BTNN	Golder (1998a,b)
1997	Suncor Winter Wildlife	12.41 in January 15.98 in February 3.53 in March	January: preferred upland avoided riparian February: preferred upland avoided riparian and escarpment March: preferred upland avoided riparian	Golder (1998a,b)
1997	Mobil Lease 36	3.99	most in closed canopy black spruce, white spruce, black spruce-tamarack bog and white spruce-aspen mixedwood; avoided aspen stands	URSUS and Komex (1997)
1998	Suncor Firebag Project	8.96	preferred b4 and BTNN/BFNN; avoided a1, b2 and FONS	Suncor (2000)

Table E-20 Snoeshow Hare Track Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day)	Habitat Preference	Reference
1998 to 1999	Suncor Wildlife Monitoring	10.41 in reclaimed 23.29 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Muskeg River Pipeline	mean: 204.7	most common in h1	AXYS (2000b)
2000	Canadian Natural Primrose and Wolf Lake Project	incidental observations	found in aspen, jack pine/aspen, shrubby fen, treed fen, aspen/white spruce, black spruce/jack pine	Canadian Natural (2000)
2000	TrueNorth Fort Hills Oil Sands Project	10.13	preferred d2, g1 and FTNN; avoided b1, d1, e1 and SONS	Golder (2000d)
2000	Suncor Wildlife Monitoring	10.85 in Lease 86/17 17.78 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	90.90	preferred d2, d3, SONS and STNN; avoided e1, FONS, h1 and shrub	OPTI (2000)
2001	Gulf Surmont In-situ Oil Sands Project	no overall track count/km-track day provided	found in all habitats except e1. Highest track counts were found in b3 and a1	Gulf (2001)
2001	Canadian Natural (Rio Alto) Kirby Project	112.5	preferred b1, d3, e2, g1, STNN; avoided b3, d1, d2, FONS, MONG, MONS, WONN and disturbed	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	48.77	preferred b3, c1, f1, g1, SONS; avoided b2, d1, d2, BTNN, FONS, FTNN, MONG, STNN and cutlines	Petro–Canada (2001)
2001	Shell Jackpine Mine – Phase 1	88.26	preferred b4, c1, FTNN, g1, h1, MONS and STNN	Golder (2002a)
2001	Canadian Natural Horizon Project	44.57	preferred b1, b3, d1, g1, h1, BTNN,FTNN, FONS, STNN, and seismic line; avoided b4, d2, e1, e3, FONG, MONG, cutblock and road	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	19.37	observed in d2, FTNN, e3, FONS, BTNN, h1, e2, and disturbed (cutblock); significant preference for d2 and e3; avoided e2, BTNN, FONG, FONS, cutline/disturbance	Golder (2003b)
2002	Devon Jackfish Project	23.2	highest track densities in a1,c1,i2,k1,h1,g1 and j1	Devon Canada (2004)
2003	EnCana Christina Lake Thermal Project	0.67	observed in BTNN,d2 and g1	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	13.3	Preference for a1, c1, d2, d3, g1; avoided b2, d1, FONS, FTNN, BTNN, MONS and WONN	MEG (2005)
2004	Suncor Monitoring Five Year Report	12.87	surveys conducted in natural sites	Golder (2004a)
2004	Suncor Voyageur	10.10 0.71	preference for treed wetlands and black and white spruce forests preference for d2 and BTNN	Golder (2005)

Table E-20 Snoeshow Hare Track Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day)	Habitat Preference	Reference
2004 to 2005	Canadian Natural Primrose East Expansion	4.37	preferred c1, d2 , d3, and g1; avoided FONS, FTNN, BTNN, SONS, and WONN	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	2.2	observed in j1, c1, burn area, k2, and k3	Devon Canada (2006)
2005 to 2006	Long Lake South Project	8.4	most observed in e3	OPTI/Nexen (2006)
2006	Suncor Voyageur South	4.21	primarily observed in BTNN, d2, FTNN, g1, STNN	Non-published data
2006	Confidential Project	5.76	primarily observed in BTNN, FTNN, FONS	n/a
2007	Kai Kos Dehseh	3.8	most observed in c1, a1, j3	North American 2007

n/a = Not applicable.

OSLO = Other Six Lease Owners.

Table E-21 Red Squirrel Track Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1970 to 1975	traplines	49.6 animals/ 100 km^2 trapped	n/a	Boyd (1977)
1975 to 1976	Syncrude Lease 17	2.33; 1.19 squirrels/ha based on a midden study	preferred mixedwood, white spruce, jack pine and forested black spruce; avoided aspen, black spruce-willow, tall shrub, dwarf birch-tamarack, riparian and disturbed	Penner (1976)
1980	Canstar Project 80	2.08	preferred aspen, mixedwood, jack pine and riparian white spruce; avoided black spruce-muskeg, open muskeg and riparian shrub	Skinner and Westworth (1981)
1981 to 1982	Canstar Lease	1.59 in February	preferred mixedwood avoided aspen, balsam poplar, willow, fen, willow wetlands and riparian aspen	Westworth and Brusnyk (1982)
1986	OSLO	no overall track count/km-track day provided	track densities were greatest in pine, spruce and mixedwood forests and in bogs, no tracks were observed in aspen forest, shrubland and fens	Duncan et al. (1986)
1995	Solv-Ex Oil Sands Co-production Experimental Progect	6.89	most in white spruce	Bovar-Concord Environmental (1995)
1995	Syncrude Aurora North	0.63 in January	preferred mixed coniferous and riparian white spruce; avoided cleared aspen, aspen forest, open tamarack-bog birch, fen and willow wetlands, riparian balsam poplar and shrub and cleared peatland	Westworth, Brusnyk and Associates (1996b)
1996	Suncor Mine, Lease 23 and Steepbank Mine	2.78 in December 0.42 in February	preferred closed jack pine and closed mixed coniferous-black spruce dominant; avoided black spruce-tamarack, open black spruce, open tamarack fen, wetlands shrub complex, disturbed, shoreline and fen	Westworth, Brusnyk and Associates (1996a)
1997	Shell Muskeg River Mine	5.65	preferred closed white spruce, closed mixedwood-white spruce dominant; avoided closed mixed wood, closed mixed coniferous-black spruce dominant, open and closed fen	Golder (1997a)
1997	Suncor Winter Wildlife	0.35 January 0.24 in February	January: preferred d2; avoided a1, h1, Shrub, FTNN, BTNN and WONN February: no preferences	Golder (1998a,b)

Table E-21 Red Squirrel Track Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
1997	Suncor Winter Wildlife	0.62 in January 3.18 in February 9.86 in March	January: preferred riparian; avoided upland February and March: preferred escarpment; avoided upland	Golder (1998a,b)
1997	Mobil Lease 36	2.62	most in white spruce-aspen mixedwood, jack pine, white spruce, black spruce-aspen and black spruce-tamarack	URSUS and Komex (1997)
1998	Suncor Firebag Project	1.00	preferred b4, c1 and BTNN/BFNN; avoided b2, g1, FONS and FTNN/FFNN	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	2.77 in reclaimed 15.64 in riparian area beside disturbance	n/a	Golder (1999a)
2000	ATCO Muskeg River Pipeline	mean: 13.8	most common in d3, also common in h1	AXYS (2000b)
2000	Canadian Natural Primrose and Wolf Lake Project	incidental observations	found in poor fen/bog, treed fen, black spruce/jack pine, aspen/white spruce and white spruce/black spruce	Canadian Natural (2000)
2000	TrueNorth Fort Hills Oil Sands Project	0.31	preferred BTNN; avoided d1, e1, g1, Shrub and SONS	Golder (2000d)
2000	Suncor Steepbank Wildlife Monitoring	0.23 in Lease 86/17 0.30 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	1.25	preferred d3; avoided d1, FTNN and shrub	OPTI (2000)
2001	Canadian Natural (Rio Alto) Kirby Project	3.70	preferred d2 and g1; avoided FONS and FTNN	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	2.50	preferred d2; avoided BTNN and FONS	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	0.47	observed in a1, b4, c1, d2, d3, FTNN, g1 and h1; observed incidentally in a1, b1, b3, c1, d1, d2 and FONS	Golder (2002a)
2001	Canadian Natural Horizon Project	2.31	observed in b1, b3, d1, d2, d3, e1, e2, e3, h1, BTNN,FTNN, STNN, burn and cutblock; avoided d1, g1, BTNN, FTNN, FONS, STNN, SONS, burn and cutblock	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	3.57	observed in d2, e3, FTNN, e2 and BTNN; preference for e3; avoided BTNN and FTNN	Golder (2003b)

Table E-21 Red Squirrel Track Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day unless otherwise noted)	Habitat Preference	Reference
2002	Devon Jackfish Project	9.6	highest track densities in d3,e2 and h1	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	6 incidental observations during other surveys on the LSA	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	4.57	Preferred d2, d3; avoided FTNN, FONS, MONS, WONN	MEG (2005)
2004	Suncor Voyageur	1.94 1.26	preference for mixedwood and white spruce forests observed in a1, b1, b3, c1, d2, g1, BTNN, FTNN, FONG, disturbed - vegetated	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	5.81	preferred c1, d2, and d3; avoided FTNN, BTNN, FONS, SONS, and WONN	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	1.0	observed in i1, h1, b4, d3, and b1	Devon Canada (2006)
2005 to 2006	Long Lake South Project	3.3	most observed in f3	OPTI/Nexen (2006)
2006	Suncor Voyageur South	1.65	observed primarily in d2, d3, g1, e2, h1	Non-published data
2006	Confidential Project	4.63	observed primarily in BTNN, d1, FTNN, FONS	n/a
2007	Kai Kos Dehseh	3.2	most observed in d3	North American 2007

n/a = Not applicable.

OSLO = Other Six Lease Owners.

Table E-22 Bat Survey Results Within the Boreal Mixedwood Forests of Alberta

Year	Project	Activity Results	Bat Captures	Habitat Use	Reference
1993 to 1994	MSc Research (Lac La Biche, AB)	1933 passes (passes/hr n/a) *Myotis* spp.[(a)], silver-haired, big brown and hoary bats	99 bats (bat /net-night n/a) little brown (80), northern long-eared (1), silver-haired (17) and hoary (1) bats	captured and detected primarily in old and mature aspen mixedwood forest	Crampton and Barclay (1998)
1999 to 2000	MSc Research (near Peace River, AB)	2193 passes (1.6 passes/hr): little brown, northern long-eared and silver-haired bats	56 bats (0.31 /net-night): little brown (41), northern long-eared (13) and silver-haired (2) bats	captured in aspen dominant and white spruce dominant forest in cutlines, above puddles and ponds; detected in aspen dominant, white spruce dominant and mixedwood forests within open patches and closed canopies	Patriquin (2001)
2000	Gulf Surmont Supplemental Wildlife Surveys	161 passes (35 passes/hr): *Myotis* spp.[(a)] , hoary, big brown and silver-haired bats	30 bats (0.24 /net-hr): little brown (25), hoary (3) and silver-haired (2) bats;	n/a	Gulf (2001)
2000	Bat Surveys of Central and Northwestern AB (Caribou River)	11.4 passes/hr[(b)] (total n/a): detected *Myotis* spp.[(a)] and larger spp.[(c)]	0 bats	dry mixedwood subregion	Vonhof and Hobson (2001)
2000	Bat Surveys of Central and Northwestern AB (Rainbow Lake)	15 passes/hr[(b)] (total n/a): detected *Myotis* spp.[(a)] and larger spp.[(c)]	2 bats over 4 nights: northern long-eared bats	wet mixedwood subregion	Vonhof and Hobson (2001)
2000	Bat Surveys of Central and Northwestern AB (Sousa Creek)	39 passes/hr[(b)] (total n/a): *Myotis* spp.[(a)] and larger spp.[(c)]	11 bats over 6 nights: little brown (2), northern long-eared (6) and big brown (3) bats	wet mixedwood subregion	Vonhof and Hobson (2001)
2000	Bat Surveys of Central and Northwestern AB (Wabaska River)	19.8 passes/hr[(b)] (total n/a): *Myotis* spp.[(a)] and larger spp.[(c)]	10 bats over 7 nights: little brown (7), northern long-eared (2) and big brown (3) bats	central mixedwood subregion	Vonhof and Hobson (2001)

Table E-22 Bat Survey Results Within the Boreal Forest of Alberta (continued)

Year	Project	Activity Results	Bat Captures	Habitat Use	Reference
2001	Bat Surveys in Northeastern AB	approximately 270 passes (ca. 8.78 passes/hr): detected *Myotis* spp.[(a)], larger spp.[(c)] and hoary bats	36 bats (0.23 bat/net-hr): little brown (31), northern long-eared (3) and silver-haired (2) bats	little brown bats captured primarily above water, northern long-eared bats captured in cutlines and silver-haired bats captured above water; no habitat for echolocation calls provided	Schowalter (2001) Hubbs and Schowalter (2003)
2001	Canadian Natural (Rio Alto) Kirby Project	380 passes (15.3 passes/hr): *Myotis* spp.[(a)], larger spp.[(c)] and little brown bats	4 bats (0.06 bat/net-hr): little brown bats	captured in e2 cutline; detected primarily in FONG and BTNN	Rio Alto (2002)
2001	Petro-Canada Wildlife Surveys	45 passes (2.2 passes/hr): *Myotis* spp.[(a)] and large spp.[(c)]	1 bat (0.01 bat/net-hr): silver-haired	captured above water in MONG; detected primarily in d2 as well as in MONS, MONG and BTNN.	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1 Wildlife Surveys	101 passes (3.9 passes/hr): *Myotis* spp.[(a)], larger spp.[(c)] and little brown bats	6 bats (0.13 bat/net-hr): northern long-eared (5) and little brown (1) bats	captured in b1, d1 and d2 cutlines; detected primarily in e2-cutline and SONS, as well as d1 forest, b1, d1 and d2 cutlines, FONS and STNN.	Golder (2002a)
2001	Canadian Natural Horizon Project	323 passes (15.3 passes/hr); *Myotis* spp.[(a)], larger spp.[(b)], little brown and northern long-eared bats	4 bats (0.08 bat/net-hr): little brown (1), northern long-eared (2) and silver-haired (1) bats	captured in a1-cutline and MONS; detected primarily in MONS, as well as in a1 and e1 forest and cutlines	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	28 passes and 2 feeding buzzes (1.88 passes/hr); *Myotis* spp.[(a)], larger spp.[(b)], little brown bats	7 captures; red (1), northern long-eared (4), little brown (2) bats	captured in d2 and h1 ecosites along cutlines; red bat captured in h1 disturbance and first red bat captured in northern Alberta	Golder (2003b)
2004	MEG Energy Christina Lake Regional Project	2.9 passes/hr, 0.5 buzzes per hour; *Myotis* spp., big brown/silver haired, red and hoary bats	1 capture; little brown bat	captured in FTNN wetlands type along cutline; passes and feeding buzzes produced within c1, d2, FTNN and WONN	MEG (2005)
2004	Suncor Voyageur	n/a	3 captures; northern long-eared (2), little brown (1) bats 5 captures; northern long-eared (2), little brown (3) bats	captured in d2 in both LSAs	Golder (2005)

Table E-22 Bat Survey Results Within the Boreal Forest of Alberta (continued)

Year	Project	Activity Results	Bat Captures	Habitat Use	Reference
2004 to 2005	Canadian Natural Primrose East Expansion	432 passes (3129 minutes) and 21 buzzes; *Myotis spp.* 3.2 passes/hr, red 1.4 passes/hr, hoary 1.0 passes/hr	2 little brown bats	captured in c1 and SONS; most activity in c1, d2, and d1	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	n/a	2 captures; little brown bats	captured along road	Devon Canada (2006)
2006	Suncor Voyageur South	46 passes (11.5 passes/hr), 0 feeding buzzes, *Myotis lucifugus / Myotis volan* 30 passes, high freq bats 14 passes, *Myotis septentrionalis* 12 passes	2 red bats, 1 silver-haired bat, 14 northern long-eared bats, 9 little brown bats	captured in d2, h1	Non-published data
2006	Confidential Project	24 passes (240 minutes), 0 buzzes, *Eptesicus fuscus/Lasionycteris noctivigans* 9 passes, *Myotis lucifugus / Myotis volans* 4 passes, *Lasiurus borealis* 1 pass, high frequency bats 1 pass	1 red bat, 2 silver-haired bats, 2 northern long-eared bats, 2 little brown bats	captured in d2	n/a
2007	Kai Kos Dehseh	*Eptesicus fuscus/ Lasionycteris noctivigans 5 recordings* *Myotis lucifugus 12 recordings* *Lasiurus borealis 1 recording*	none	not recorded	North American 2007

(a) *Myotis* species were difficult to differentiate by echolocation calls, therefore they were sometimes grouped as *Myotis* spp.
(b) Numbers were extrapolated from figures and represent approximate mean values.
(c) Larger bat species could not be differentiated on basis of echolocation calls, therefore they were grouped as larger spp. This group may include silver-haired and big brown bats.

n/a = Not applicable.

Table E-23 Small Mammal Survey Results Within the Oil Sands Region

Small Mammal Species	Year	Project	Abundance (# captures/100 trap nights unless otherwise noted)	Habitat Association	Reference
masked shrew	1979	Syncrude Lease 17	abundant	n/a	as reported in Westworth (1979)
	1979	Syncrude Lease 17	present	n/a	Michielson and Radvanyi (1979)
	1997	Muskeg River Mine Project	4 to 17	margins of moist fields, bogs, marshes and moist or dry woods, including mixedwood and upland coniferous	Golder (1997a)
	1980	AOSERP	common	aspen and willow habitats	as reported in Green (1980)
	1995	Alberta Environment Centre/Canadian Forest Service. Alberta Land and Forest Service	n/a	aspen mixedwood	Stelfox (1995)
	2000	Gulf Surmont In-Situ Oil Sands Project	3	b2,d1,d3	Gulf (2001)
dusky shrew	1995	Alberta Environment Centre/Canadian Forest Service. Alberta Land and Forest Service	n/a	aspen mixedwood	Stelfox (1995)
	2000	Gulf Surmont In-Situ Oil Sands Project	2	e3 and h1	Gulf (2001)
water shrew	1979	Syncrude Lease 17	common	wet margins of lakes, streams, and muskegs	as reported in Westworth (1979)
arctic shrew	1979	Syncrude Lease 17	scarce	n/a	as reported in Westworth (1979)
	1997	Muskeg River Mine Project Project	n/a	bogs, marshes and grassy clearings	Golder (1997a)
	1995	Alberta Environment Centre/Canadian Forest Service, Alberta Land and Forest Service	n/a	aspen mixedwood	Stelfox (1995)
	2000	Gulf Surmont In-Situ Oil Sands Project	1	FONS	Gulf (2001)

Table E-23 Small Mammal Survey Results Within the Oil Sands Region (continued)

Small Mammal Species	Year	Project	Abundance (# captures/100 trap nights unless otherwise noted)	Habitat Association	Reference
pygmy shrew	1979	Syncrude Lease 17	common	n/a	as reported in Westworth (1979)
	1980	AEOSERP	common	aspen and willow habitats	as reported in Green (1980)
	1997	Shell Muskeg River Mine Project	uncommon	wooded areas (mixedwood), bogs, wet meadows and clearings within forests	Golder (1997a)
	2000	Gulf Surmont In-Situ Oil Sands Project	4	d1, FONS and FONG	Gulf (2001)
least chipmunk	1997	Muskeg River Mine Project	n/a	clearings, forest edges and disturbed areas	Golder (1997a)
	1993	University of Alberta	n/a	aspen mixedwood	Moses and Boutin (2001)
	2004 to 2005	Primrose East Expansion	no observations	n/a	Canadian Natural (2006)
red-backed vole	1979	Syncrude Lease 17	9.3 to 19.1	n/a	as reported in Westworth (1979)
	1980	AOSERP	abundant	forest and shrub-dominant habitats, balsam poplar, aspen and jack pine communities	as reported in Green (1980)
	1984	Syncrude Mildred Lake	n/a	prefer balsam poplar, mixedwood and tamarack forest	Syncrude (1984)
	1993	University of Alberta	n/a	aspen mixedwood	Moses and Boutin (2001)
	1997	Muskeg River Mine Project	n/a	disturbed areas, mixedwood, riparian, upland coniferous forests and wetlands	Golder (1997a)
	2000	OPTI Long Lake Project	n/a	deciduous, upland coniferous, mixedwood forests, riparian areas and wetlands	OPTI (2000)
	2000	Gulf Surmont In-Situ Oil Sands Project	38	B2,b3,d1,d2,d3, e1, e3, h1, BTNN, FONS and FONG	Gulf (2001)
	2002	Suncor Reclamation Monitoring	1	e2	Golder (2003b)
	2004	Suncor Monitoring Five Year Report	1.3 / trap night	n/a	Golder (2004a)

Table E-23 Small Mammal Survey Results Within the Oil Sands Region (continued)

Small Mammal Species	Year	Project	Abundance (# captures/100 trap nights unless otherwise noted)	Habitat Association	Reference
	2004	Suncor Voyageur	no observations 5 captured total	n/a observed in b1, b3, d2, FTNN	Golder (2005)
heather vole	1993	University of Alberta	n/a	aspen mixedwood	Moses and Boutin (2001)
meadow vole	1979	Syncrude Lease 17	common-abundant	n/a	as reported in Westworth (1979)
	1979	AOSERP	n/a	forest and shrub-dominant habitats. Moist habitats with dense grass or sedge cover	Green (1979)
	1984	Syncrude Midred Lake	n/a	prefers successional areas, willow shrub and tamerack forests	Syncrude (1984)
	1993	University of Alberta	n/a	aspen mixedwood	Moses and Boutin (2001)
	1997	Alsands Region	n/a	n/a	Fort McKay Environment Services Ltd (1997)
	1997	Muskeg River Mine Project	n/a	clearings, wet meadows with grass cover, disturbed areas, mixedwood, riparian, upland conifer forest and wetlands	Golder (1997a)
	2000	OPTI Long Lake Project	n/a	riparian	OPTI (2000)
	2000	Gulf Surmont In-Situ Oil Sands Project	5	b2,d1, h1 and FONS.	Gulf (2001)
	2002	Suncor Reclamation Monitoring	7	shrubby grassland	Golder (2003b)
Deer Mouse	2004	Suncor Monitoring Five Year Report	2.5 / trap night	n/a	Golder (2004a)
	1979	Syncrude Lease 17	abundant	n/a	as reported in Westworth (1979)
	1979	Syncrude Lease 17	abundant	n/a	Michielson and Radvanyi (1979)
	1979	AOSERP	n/a	grasslands and early successional habitats	Green (1979)

Table E-23 Small Mammal Survey Results Within the Oil Sands Region (continued)

Small Mammal Species	Year	Project	Abundance (# captures/100 trap nights unless otherwise noted)	Habitat Association	Reference
	1980	AEOSERP	n/a	forest and shrub-dominant habitats and recently disturbed areas (e.g. cutblocks)	Green (1980)
	1984	Syncrude Midred Lake	n/a	most abundant in aspen, balsam poplar or mixedwood forests	Syncrude (1984)
Deer Mouse (continued)	1993	University of Alberta	n/a	aspen mixedwood	Moses and Boutin (2001)
	2000	OPTI Long Lake Project	n/a	deciduous, coniferous and mixedwood forests and riparian	OPTI (2000)
	2000	Gulf Surmont In-Situ Oil Sands Project	16	a1,b2, b3, d1 and d2	Gulf (2001)
	1993	University of Alberta	n/a	aspen mixedwood	Moses and Boutin (2001)
	2002	Suncor Reclamation Monitoring	38	e1, e2, deciduous-willow, deciduous misc., mixedwood grassland, mixedwood willow, shrubby grassland	Golder (2003b)
	2004	Suncor Monitoring Five Year Report	30 / trap night	n/a	Golder (2004a)
meadow jumping mouse	1997	Muskeg River Mine Project	n/a	grasslands, riparian meadows,clearings, forest edges	Golder (1997a)
	2000	OPTI Long Lake Project	n/a	riparian	OPTI (2000)
northern bog lemming	1997	Muskeg River Mine Project	n/a	wet forested areas, bogs, riparian and wetlands	Golder (1997a)
	2000	OPTI Long Lake Project	n/a	wetlands	OPTI (2000)
flying squirrel	2004 to 2005	Primrose East Expansion	no observations	n/a	Canadian Natural (2006)
mice and voles combined	2005	Devon Jackfish Phase 2 Project	n/a	observed in d3, i1, j2, c1, and b1	Devon Canada (2006)

n/a = Not applicable.

AOSERP = Alberta Oil Sands Environmental Research Program.

Table E-24 Owl Survey Results Within the Oil Sands Region

Year	Project	Species (Abundance)	Habitat	Reference
1997	Shell Muskeg River Mine	boreal owl (7)	mixedwood, trembling aspen	Golder (1997)
		great horned owl (1)	black spruce stand	
		Incidentals: great gray owl (4)	unknown	
1998	Steepbank River Valley, Shipyard Lake, & L25 and 29 Uplands	great gray owl (1)	STNN	Golder (1998b)
		Incidentals: great gray owl (1)	a1	
		northern hawk owl (1)	BTNN	
1998	Suncor Millennium Project	great gray owl (1)	STNN	Golder (1998a)
		Incidentals: great gray owl (2)	riparian area, a1	
2000	Suncor Firebag Project	great horned owl (7)	FONS, FTNN, d2, g1, h1	Golder (2000e)
		great gray owl (1)	FONS	
		boreal owl (5)	FTNN, g1	
		barred owl (4)	FTNN, d2, g1	
		Incidentals (1998):		
		great gray owl (n/a)	e1	
		great horned owl (n/a)	f2, BTNN	
		northern hawk owl (n/a)	FTNN, c1	
		unknown owl (n/a)	FTNN, BTNN, e1	
2000	Canadian Natural Primrose and Wolf Lake Project	great-horned owl (10)	shrubby fen, poplar/aspen, aspen/white spruce, white spruce, poor fen/bog, treed fen	Canadian Natural (2000)
		northern-hawk owl (2)	aspen/white spruce, poplar/aspen	
		boreal owls (3)	aspen/white spruce, white spruce/jack pine	
		short-eared owl (1)	shrubby fen	
		northern saw-whet owl (1)	poplar/aspen	
		barred owl (1)	white spruce	
2000	OPTI Long Lake Project	great horned owl (16)	b3, d1, d2, g1, BTNN, SONS	OPTI (2000)
		great gray owl (4)	b2, b3, BTNN	

Table E-24 Owl Survey Results Within the Oil Sands Region (continued)

Year	Project	Species (Abundance)	Habitat	Reference
		boreal owl (10)	g1, BTNN	
		barred owl (15)	b2, b3, d1, d2	
2001	Gulf-Surmont In-Situ Oil Sands Project	barred owl (14)	b1, b2, d1, d2, h1, i1, j1	Gulf (2001)
		boreal owl (1)	i1	
		great horned owl (25)	b1, b2, d1, d2, e1, i1, j1	
		long-eared owl (1)	k3	
		Incidentals:		
		barred owl (27)	a1, b1, b2, c1, d1, e1, h1, i1, j1	
		boreal owl (6)	d2, i1, j1, k1	
		great gray owl (7)	d1, e1, i1, k2, k3	
		great horned owl (34)	b1, b2, d1, d2, e1, i1, j1	
		long-eared owl (2)	f1, k3	
		northern saw-whet owl (2)	c1, d1	
2001	Albian Sands Muskeg River Mine Project Wildlife Assessment	great horned owl (1)	b4	Westworth Associates (2001)
		Incidentals: great horned owl (5)	shrubland, d1, unknown	
		great gray owl (1)	j2	
2001	PanCanadian Christina Lake Thermal Project Wildlife Monitoring	great horned owl (5)	f3, FTNN	Golder (2000c)
		boreal owl (3)	e3, c1/g1, FTNN	
2001	Canadian Natural (Rio Alto) Kirby Project	great horned owl (10)	b1, d2, g1, FTNN	Rio Alto (2002)
		boreal owl (2)	b1, d2	
2001	Petro-Canada Meadow Creek Project	great horned owl (4)	b1, g1, SONS	Petro-Canada (2001)
		great gray owl (1)	d2	
		boreal owl (2)	SONS, FONG	
		barred owl (5)	b3, c1, d2, g1, FTNN	
2001	Shell Jackpine Mine – Phase 1	great horned owl (5)	d2, BTNN, FTNN	Golder (2002a)
		great gray owl (1)	BTNN	

Table E-24 Owl Survey Results Within the Oil Sands Region (continued)

Year	Project	Species (Abundance)	Habitat	Reference
2001	Canadian Natural Horizon Project	great horned owl (24)	d2, d3, BTNN, FTNN, cutblock	Canadian Natural (2002)
		boreal owl (14)	a1, d2, BTNN, FTNN	
		barred owl (8)	b1, d2, e3	
2002	Suncor South Tailings Pond Project	boreal owl (11)	d1, d2, h1, FONS, FTNN, STNN	Golder (2003b)
		barred owl (2)	d3, SONS	
		great gray owl (1)	BTNN	
		great horned owl (1)	b3	
		northern saw-whet owl	STNN	
2002	Devon Jackfish Project	boreal owl (19) northern saw-whet owl (4) great horned owl (4) barred owl (1) *Incidentals:* great gray owl(1)	not reported	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	boreal owl (4) northern saw-whet owl (8) *Incidentals:* boreal owl (3) great gray owl (2) great-horned owl (3) northern saw-whet owl (4)	BTNN,b2 and g1 BTNN,FTNN,d2,e2 and g1	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	boreal owl (9) barred owl (5) great gray owl (8) great horned owl (3)	c1, burn, b1, d1, FTNN, FONS, disturbed a1, burn, BTNN, d1, STNN BTNN, FONS, a1, c1, burn c1, d2, burn	MEG (2005)
2004	Suncor Monitoring Five Year Report	boreal owl (13)	aspen-white spruce; black spruce; white spruce – aspen; black spruce- birch and black spruce-aspen	Golder (2004a)
		great gray owl (3)	black spruce and black spruce - tamarack	
		barred owl (1)	cutblock area – aspen-white spruce	

Table E-24 Owl Survey Results Within the Oil Sands Region (continued)

Year	Project	Species (Abundance)	Habitat	Reference
2004	Suncor Voyageur	boreal owl (4)	aspen-white spruce	Golder (2005)
		great horned owl (1)	d1	
		no observations	n/a	
2004 to 2005	Primrose East Expansion	boreal owl (14)	a1, b1, FTNN, FONS/BTNN, MONG, h1	Canadian Natural (2006)
		great gray owl (4)	A1, FONG, FONS/BTNN	
		northern saw-whet owl (1)	h1	
2005	Devon Jackfish Phase 2 Project	*Incidentals:* barred owl (2) great grey owl (3) short-eared owl (1)	n/a	Devon Canada (2006)
2006	Suncor Voyageur South	boreal owl (18)	d1, d2, BTNN, FTNN, SONS, STNN, industrial, cutblock	Non-published data
		great gray owl (4)	d1, d2, FTNN, cutblock	
		barred owl (1)	d3	
2006	Confidential Project	boreal owl (75)	a1, b1, BTNN, d1, e1, FONS, FOPN, FTNN, g1, h1, MONG, road, STNN	n/a
		barred owl (5)	BTNN, FTNN, g1	
		great gray owl (18)	a1, BTNN, c1, FONS, FTNN, STNN	
		great horned owl (28)	a1, BTNN, c1, d1, FONS, FOPN, FTNN, g1, h1, MONG, SONS, STNN	
		long-eared owl (3)	a1, b1, MONG	
		northern saw-whet (4)	h1, FTNN	
2007	Kai Kos Dehseh	barred owl (5)	c1, d1	North American 2007
		boreal owl (1)	c1	
		great gray owl (1)l	clear cut	
		great horned owl (2)	b2	
		northern pygmy owl (3)	clear cut, d1, g1	

n/a = Not applicable.

Table E-25 Raptor Survey Results Within the Oil Sands Region

Year	Project	Species (Abundance)	Habitat	Reference
1996	Suncor Steepbank Mine	broad-winged hawk (1) northern goshawk (1) northern harrier (1) bald eagle (1) bald eagle nest (1) unidentified accipiter (1) *Incidentals:* red-tailed hawk (1) northern harrier (1) sharp-shinned hawk (2) American kestral (1) bald eagle (3) sharp-shinned hawk (2) broad-winged hawk (1) northern harrier (1)	riparian deciduous forest over Athabasca river near Athabasca river east bank of Athabasca River aspen grove near Beaver River open sb-Labrador tea closed shrub complex hab. adjacent to aspen cutblock adjacent to aspen cutblock near Athabasca River east of wetlands 2 east side of Ruth Lake north end of reservoir	Westworth, Brusnyk and Associates (1996c)
1997	Shell Muskeg River Mine	*Incidentals:* red-tailed hawk (undisclosed number)	unknown	Golder (1997a)
1998	Suncor Project Millennium	bald eagle (1) red-tailed hawk (1) *Incidentals:* red-tailed hawk (undisclosed number)	unknown lake area unknown	Golder (1998a)
1998	Mobil Lease 36	*Incidentals:* bald eagle (2)	unknown	Golder (1999b)
2000	Suncor Firebag Project	*Incidentals (1998);* northern harrier (n/a) rough-legged hawk (n/a) *Incidentals (1999):* northern harrier (2)	 FONS BTNN BTNN; FONS	Golder (2000e)

Table E-25 Raptor Survey Results Within the Oil Sands Region (continued)

Year	Project	Species (Abundance)	Habitat	Reference
2000	Canadian Natural Primrose and Wolf Lake Project	*Incidentals*: goshawks red-tailed hawk northern harrier ospreys	 marsh, treed fens jackpine/aspen, shrubby swamp shrubby swamp, deep water near a pond	Canadian Natural (2000)
2000	OPTI Long Lake Project	*Incidentals:* broad-winged hawk (2) Cooper's hawk (1) northern goshawk (9) northern harrier (6) osprey (2) red-tailed hawk (2) sharp-shinned hawk (1)	 mixedwood mixedwood mixedwood, ponds, Gregoire River, Sb bog, willow, deciduous fen, mixedwood, ponds Canoe Lake, Kiskatinaw Lake Gregoire River, fen Dogwood (e1)	OPTI (2000)
2001	Gulf-Surmont In-Situ Oil Sands Project	northern goshawk (10) *Incidentals:* Cooper's hawk (1) Sharp-shinned hawk (2)	d2, e2, h1, e1, d1 d1 d1, k2	Gulf (2001)
2001	Albian Sands Muskeg River Mine Project Wildlife Assessment	northern harrier (3) sharp-shinned hawk (9) northern goshawk (3) broad-winged hawk (11) red-tailed hawk (15) American kestral (9) merlin (5)	j2 e2, d1, Lt-Sb d1 d1, d2, f1 b4, d1, b1 k2 b3	Westworth Associates (2001)
2001	PanCanadian Christina Lake Thermal Project Wildlife Monitoring	broad-winged hawk (1) unknown species (1)	FTNN f3	Golder (2000c)
2001	Suncor Firebag Project Supplemental	northern harrier (3)	b3, j1, b4	Golder (2000e)
2001	Canadian Natural (Rio Alto) Kirby Project	red-tailed hawk (3) northern harrier (1) sharp-shinned hawk (1) Swainson's hawk (2) Unknown (1)	b1, FTNN FTNN FTNN c1 d1	Rio Alto (2002)

Table E-25 Raptor Survey Results Within the Oil Sands Region (continued)

Year	Project	Species (Abundance)	Habitat	Reference
2001	Petro-Canada Meadow Creek Project	northern goshawk (2) northern harrier (1) unknown (3)	g1, BTNN c1 BTNN, FTNN	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1	northern goshawk (1) American kestrel (1)	STNN FONS	Golder (2002a)
2001	Canadian Natural Horizon Project	bald eagle (2) osprey (2)	MONG MONG	Canadian Natural (2002)
2002	Suncor South Tailings Pond Project	American kestral (1) broad-winged hawk (1) northern harrier (1)	clearcut clearcut STNN	Golder (2003b)
2002	Suncor South Tailings Pond Project	American kestral (1) broad-winged hawk (1) northern harrier (1)	clearcut clearcut STNN	Golder (2003a)
2003	Encana Christina Lake Thermal Project	Cooper's hawk (1) *Incidentals:* northern harrier(1) red-tailed hawk(1) sharp-shinned hawk(1)	d2	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	sharp-shinned hawk (1) northern goshawk (1) merlin (1) *incidentals:* bald eagle (5) northern harrier (2) osprey (2) American kestral (1)	BTNN d2 FTNN	MEG (2005)
2004	Suncor Voyageur	American kestrel (1) sharp-shinned hawk (2) unknown (1) no observations	FTNN d2, BTNN FTNN n/a	Golder (2005)

Table E-25 Raptor Survey Results Within the Oil Sands Region (continued)

Year	Project	Species (Abundance)	Habitat	Reference
2004 to 2005	Canadian Natural Primrose East Expansion	northern goshawk (1) *Incidentals:* sharp-shinned hawks (2) northern harrier (1) unknown (1)	d2 FTNN FONS n/a	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	Cooper's hawk (2) northern goshawk (2) sharp-shinned hawks (2) red-tailed hawk (2) northern harrier (7) broad-winged hawk (1) peregrine falcon (1) *Incidentals:* northern goshawk (2) broad-winged hawk (2)	n/a	Devon Canada (2006)
2006	Suncor Voyageur South	no surveys	n/a	Non-published data
2006	Confidential Project	no surveys	n/a	n/a

n/a = Not applicable.

Table E-26 Grouse Track Survey Results Within the Oil Sands Region

Year	Project	Results (tracks/km-track day)	Habitat Preference	Reference
1995	Solv-Ex Oil Sands Co-production Experimental Project	3.04	most in aspen and aspen-white spruce[(a)]	Bovar-Concord Environmental (1995)
1997	Muskeg River Mine	1.71	preferred wetlands shrub complex; avoided closed mixedwood, closed mixed coniferous and riparian shrub dominant	Golder (1997a)
1997	Suncor Winter Wildlife	0.36 January 0.99 in February	January: preferred FTNN; avoided d1, d3, h1, BTNN, shrub and WONN February: preferred FTNN; avoided a1, d3, d2, d1 and BTNN	Golder (1998a,b)
1997	Suncor Winter Wildlife	0.19 in January 0.30 in February 0.05 in March	did not show a landscape preference	Golder (1998a,b)
1997	Mobil Lease 36	0.36	most in white spruce-aspen and aspen-white spruce mixedwood forests[(a)]	URSUS and Komex (1997)
1998	Suncor Firebag Project	10.60	preferred FONS and FTNN/FFNN; avoided a1, b1, b2, b4, c1, d1, d2, d3 and g1	Suncor (2000)
1998 to 1999	Suncor Wildlife Monitoring	1.76 in reclaimed 2.06 in riparian area beside disturbance	not determined	Golder (1999a)
2000	ATCO Pipeline	mean: 3.1	most common in d3, also common in FTNN	AXYS (2000b)
2000	TrueNorth Fort Hills Oil Sands Project	0.07	preferred STNN and SONS; avoided a1, b1, d1, d2, d3, e1, e2, g1, Shrub and BTNN	Golder (2000d)
2000	Suncor Wildlife Monitoring	4.55 in Lease 86/17 0.63 in Lease 25/97	only riparian corridors sampled	Golder (2000a)
2000	OPTI Long Lake Project	0.14	most tracks observed in the d2 and h1 ecosite phase/wetlands types	OPTI (2000)
2001	Canadian Natural (Rio Alto) Kirby Project	0.17	tracks observed in d2 and FTNN	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	0.34	most tracks observed in the d2 and b1 ecosite phase/wetlands types	Petro-Canada (2001)
2001	Canadian Natural Horizon Project	0.33 (upland game birds)	observed mostly in d2, followed by d1, b3, d3, e3, STNN and burn	Canadian Natural (2002)
2001	Shell Jackpine Mine – Phase 1	0.19 (upland game birds)	observed in b3, d2, d3	Golder (2002a)

Table E-26 Grouse Track Survey Results Within the Oil Sands Region (continued)

Year	Project	Results (tracks/km-track day)	Habitat Preference	Reference
2002	Suncor South Tailings Pond	0.38 (upland game birds)	observed in d2, FONS, cutblock	Golder (2003b)
2003	Encana Christina Lake Thermal Project	1 ruffed grouse and 4 spruce groused observed incidentally	n/a	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	0.60	observed in a1, b2, d1, d2, g1, FONS, FTNN	MEG (2005)
2004	Suncor Voyageur	0.46 0.14	preferences not established no habitat preference	Golder (2005)
2004 to 2005	Primrose East Expansion	0.46	preference for c1, avoidance of WONN	Canadian Natural (2006)
2005 to 2006	Long Lake South Project	0.2	most observed in f2	OPTI/Nexen (2006)
2006	Suncor Voyageur South	0.83	primarily observed in d2, h1, FONS	Non-published data
2006	Confidential Project	0.39	primarily observed in FTNN, g1	n/a

(a) Not statistically significant.

n/a = Not applicable.

Table E-27 Breeding Bird Survey Results Within the Oil Sands Region

Year	Project	Richness [Mean # of Species per Habitat Type]	Diversity [Shannon – Weiner Index per Habitat Type]	Listed Species [Observed Only]	Reference
1997	Shell Muskeg River Mine	6.30 to 16.0 [(a)]	1.50 to 2.50	blackburnian warbler Cape May warbler	Golder (1997a)
1998	Suncor Project Millennium	2.17 to 4.40	0.67 to 1.36	bay-breasted, blackburnian,black-throated green, Canada and Cape May warblers western tanager	Suncor (1998)
1998	Suncor Firebag Project	9.1 to 9.3	1.5 to 1.8	Blackburnian, Canada and Cape May warblers	Suncor (2000)
2000	OPTI Long Lake Project	1.56 to 3.13	0.35 to 0.97	bay-breasted warbler Cape May warbler western tanager	OPTI (2000)
2000	Canadian Natural Primrose and Wolf Lake Project	1.60 to 2.80	0.30 to 0.90	bay-breasted warbler Cape May warbler	Canadian Natural (2000)
2000	TrueNorth Fort Hills Oil Sands Project	n/a	n/a	Cape May warbler bay-breasted warbler	TrueNorth (2001)
2001	Gulf Surmont In-situ Oil Sands Project	47 total richness	1.00 to 17.0	bay-breasted,black-throated green, Canada and Cape May warblers western tanager	Gulf (2001)
2001	Suncor Firebag Project Supplemental	1.00 to 4.50	0.90 to 3.05	none observed	Golder (2000e)
2001	Canadian Natural Primrose and Wolf Lake Project Supplemental	2.70 to 4.60	1.30 to 3.30	bay-breasted, black-throated green, Canada and Cape May warblers	Canadian Natural (2000)
2001	Canadian Natural (Rio Alto) Kirby Project	1.00 to 5.00	0.00 to 3.60	western tanager	Rio Alto (2002)
2001	Petro-Canada Meadow Creek Project	1.00 to 4.00	0.00 to 2.51	Cape May warbler western tanager	Petro-Canada (2001)
2001	Shell Jackpine Mine – Phase 1 Project	1.00 to 7.00	0.00 to 6.15	bay-breasted, Canada, and Cape May warblers western tanager	Golder (2002a)
2001	Canadian Natural Horizon Project	2.17 to 6.33	0.75 to 5.12	bay-breasted, black-throated green, Canada and Cape May warblers black-backed woodpecker pileated woodpecker western tanager	Canadian Natural (2002)

Table E-27 Breeding Bird Survey Results Within the Oil Sands Region (continued)

Year	Project	Richness [Mean # of Species per Habitat Type]	Diversity [Shannon – Weiner Index per Habitat Type]	Listed Species [Observed Only]	Reference
2002	Suncor 86/17 Wildlife Monitoring	6.33 to 7.57	5.72 to 7.42	black-throated green warbler horned grebe great blue heron sandhill crane western tanager	Golder (2003b)
2002	Suncor South Tailings Pond	2.14 to 2.72	0.89 to 1.41	bay-breasted warbler pileated woodpecker Cape May warbler western tanager	Golder (2003b)
2002	Devon Jackfish Project	48 total richness	1.00 – 3.80	black tern pileated woodpecker Cape May warbler black-throated green warbler bay-breasted warbler Canada warbler western tanager	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	39 total richness	2.8-5.5 (mean diversities)	pileated wood-pecker short-billed dowitcher Cape May warbler	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	1.84 – 1.88 (mean richness)	0.65 - 0.93 (mean diversities)		MEG (2005)
2004	Suncor Monitoring Five Year Report	5.42 to 6.58 (2002) 4.14 to 5.08 (2003)	4.13 to 5.55 (2002) 2.89 to 3.95 (2003)	horned grebe great blue heron sandhill crane common nighthawk pileated woodpecker Canada warbler western tanager	Golder (2004a)

Table E-27 Breeding Bird Survey Results Within the Oil Sands Region (continued)

Year	Project	Richness [Mean # of Species per Habitat Type]	Diversity [Shannon – Weiner Index per Habitat Type]	Listed Species [Observed Only]	Reference
2004	Suncor Voyageur	1.31 to 2.05 1.65 to 2.83	2.38 to 3.12 3.07 to 4.25	western tanager pileated woodpecker Canada warbler Cape May warbler blackburnian warbler bay-breasted warbler	Golder (2005)
2004 to 2005	Canadian Natural Primrose East Expansion	0.5 to 3.00	0.25 to 1.43	pileated woodpecker	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	64 total richness	2.6 to 4.3	pileated woodpecker black-backed woodpecker bay-breasted warbler Cape May warbler western tanager	Devon Canada (2006)
2005 to 2006	Long Lake South Project	71 total richness	4.8 to 18.4	black tern pileated woodpecker Cape May warbler bay-breasted warbler Canada warbler western tanager	OPTI/Nexen (2006)
2006	Suncor Voyageur South	1.5 to 8.0	0.3 to 7.3	Canada warbler bay-breasted warbler Cape May warbler common yellowthroat western tanager eastern phoebe	Non-published data
2006	Confidential Project	0.5 to 8.0	0.0 to 7.7	bay-breasted warbler brown creeper common yellowthroat least flycatcher northern hawk-owl	n/a

(a) Methods used were different than from the present study.

n/a = Not applicable.

Table E-28 Amphibian Survey Results Within the Oil Sands Region

Year	Project	Species	Habitat	Reference
1995	Suncor Steepbank Mine	woodfrog (7)	unknown	Westworth, Brusnyk and Associates (1996d)
		boreal chorus frog (364+)	most within a sedge wetlands type with aspen/poplar	
1996	Shipyard Lake	striped chorus frog (n/a)	unknown	Golder (1996)
		wood frog (n/a)	unknown	
1998	PanCanadian Christina Lake Thermal Project Supplementals	boreal chorus frog (29)	e2, FTNN, FONS, WONS	Golder (2000c)
		boreal toad (17)	e2, FTNN, FONS	
		wood frog (2)	e2	
2000	Suncor Firebag Project	*Incidentals (1998):* boreal chorus frog (n/a)	d1, d2, FONS, FTNN, h1	Golder (2000e)
		wood frog (n/a)	d2, FONS, FTNN	
2000	Canadian Natural Primrose and Wolf Lake Project Project	boreal chorus frog (116.5)	MONG, SONS, FONG, FTNN, clearing	Canadian Natural (2000)
		wood frog (40.34)	MONG, SONS, FONG, FTNN, clearing, FONS	
		Canadian toad (6)	MONG, FONG	
		western (boreal) toad (0.5)	MONG	
2000	PanCanadian Christina Lake Thermal Project	boreal chorus frog (34)	d2, FONS, FTNN, MONG, SONS	Golder (2000d)
		boreal toad (16)	a1, f1, FTNN, MONG, SONS	
		wood frog (19)	a1, e2, e3, FONS, FTNN, MONG, SONS	
2000	OPTI Long Lake Project	boreal frog (25)	b2, b3, d1, d2, d3, e3, g1, BTNN, FONS, FTNN, MONS, STNN	OPTI (2000)
		wood frog (16)	b3, d2, e3, BTNN, FONS, FTNN, MONS, STNN	
2001	PanCanadian Christina Lake Thermal Project Supplementals	boreal chorus frog (26)	f2, f3, g1, BTNN, FTNN, FONS, FONG, MONG, SONS, clearcut	Golder (2001d)
		wood frog (22)	f2, f3, g1, BTNN, FTNN, FONS, FONG, MONG, SONS, clearcut	
		boreal toad (19)	f3, g1, BTNN, FTNN, FONS, FONG, MONG, clearcut	
2001	Suncor Firebag Project Supplemental	boreal chorus frog (18)	ephemeral pond, permanent creek	Golder (2000e)
		wood frog (7)	ephemeral pond	
2001	Canadian Natural (Rio Alto) Kirby Project	boreal chorus frog (154)	b1, b4, c1, d1, d2, g1, disturbed, BTNN, FONS, FTNN, MONG, MONS, SONS, STNN, WONN	Rio Alto (2002)
		wood frog (149)	b4, c1, d1, d2, g1, disturbed, BTNN, FONS, FTNN, MONG, MONS, SONS, STNN, WONN	
		boreal toad (81)	c1, d1, d2, g1, disturbed, BTNN, FONS, FTNN, MONG, MONS, SONS, STNN, WONN	
2001	Petro-Canada Meadow Creek Project	boreal chorus frog (41)	b3, c1, d2, BTNN, FONG, FONS, FTNN, MONG, MONS, shrubland, SONS, STNN	Petro-Canada (2001)

Table E-28 Amphibian Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Habitat	Reference
		wood frog (82)	b1, b3, c1, d2, g1, BTNN, FONG, FONS, FTNN, MONG, MONS, shrubland, SONS, STNN	
2001	Shell Jackpine Mine – Phase 1	boreal chorus frog (28)	b2, d2, FTNN, FONG, FONS,MONS, MONS/SONS, MONS/STNN, STNN, SONS, WONN	Golder (2002a)
		wooded frog (28)	b2, d2, FTNN, FONG, FONS,MONS, MONS/SONS, MONS/STNN, STNN, SONS, WONN	
2001	Canadian Natural Horizon Project	boreal chorus frog (56)	a1, b3, d1, d2, e1, e2, h1, BTNN, FONS, FTNN, MONG, MONS, SONS, STNN, cutblock, landfill	Canadian Natural (2002)
		wood frog (49)	b3, e1, e2, BTNN, FONS, FTNN, MONG, MONS, SONS, STNN, cutblock	
		Canadian toad (12)	a1, d2, BTNN, FTNN, MONS, SONS, STNN, landfill	
2002	Suncor Reclamation Monitoring	Canadian toad (24) wood frog (17) boreal chorus frog (236)	reclamation vegetation classes mixedwood willow and mixedwood grassland. WOFR and BCFR also observed in deciduous willow	Golder (2003b)
2002	Suncor South Tailings Pond	wood frog (15) boreal chorus frog (25)	d2, d3, FTNN, SONS, STNN	Golder (2003b)
2002	Devon Jackfish Project	boreal chorus frog (many) wood frog (many) western toad (many)	n/a	Devon Canada (2004)
2003	Encana Christina Lake Thermal Project	boreal chorus frog (194) wood frog (41) boreal toad (119)	most observations in FTNN and FONS	Golder (2004a)
2004	MEG Energy Christina Lake Regional Project	western (boreal) toad (28) wood frog (39) boreal chorus frog (35) Canadian toad incidental	most observations within standing water along cutlines, followed by FTNN; also recorded in a1, b1, b3, BTNN, MONG, MONS, WONN	MEG (2005)
2004	Suncor Monitoring Five Year Report	wood frog (53) boreal chorus frog (636) Canadian toad (83)	reclaimed sites	Golder (2004a)
2004	Suncor Voyageur	wood frog (26) boreal chorus frog (32) wood frog (20) boreal chorus frog (24)	various	Golder (2005)

Table E-28 Amphibian Survey Results Within the Oil Sands Region (continued)

Year	Project	Species	Habitat	Reference
2004 to 2005	Canadian Natural Primrose East Expansion	wood frog (33) boreal chorus frog (98) boreal toad (5) Canadian toad (6)	c1, d2, d3, FONS, FTNN c1, d2, d3, FONS, FTNN, disturbed FONS, FTNN d2, FONS, FTNN, disturbed	Canadian Natural (2006)
2005	Devon Jackfish Phase 2 Project	western (boreal) toad (many) wood frog (several) boreal chorus frog (many)	n/a	Devon Canada (2006)
2005 to 2006	Long Lake South Project	Canadian toad (46)	most observations in NWL and CC	OPTI/Nexen (2006)
2006	Suncor Voyageur South	wood frog (34) boreal chorus frog (272) Canadian toad (8)	disturbed (11), various others disturbed (116), various others disturbed (5), e2, FONS, riparian	Non-published data
2006	Confidential Project	wood frog (31) boreal chorus frog (79) boreal toad (39) Canadian toad (2)	FTNN (18), various others FTNN (214), various others FTNN (27), various others FTNN, BTNN	n/a

n/a = Not applicable.

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